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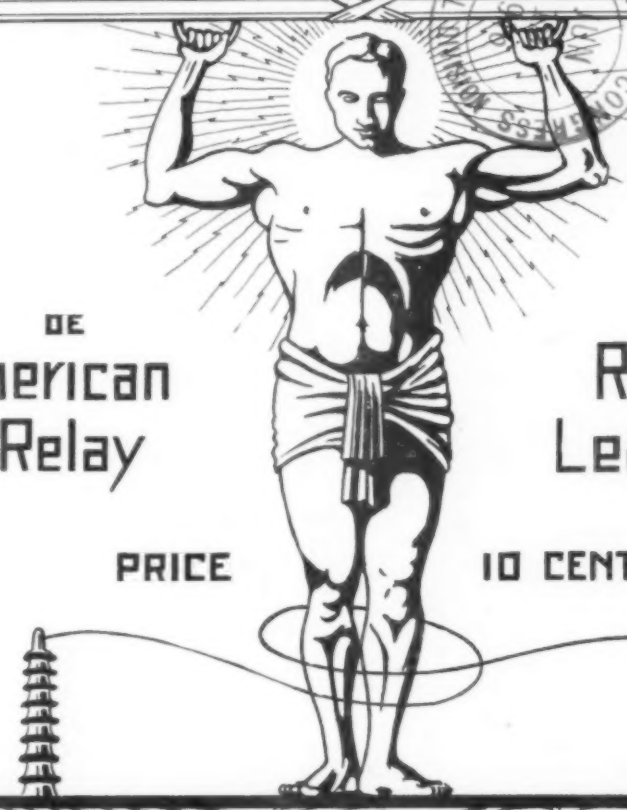

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American Relay Radio League

PRICE 10 CENTS

1916 **JUNE** 1916

WIRELESS AND THE AEROPLANE.

Meetings of the Radio Clubs.

WIRELESS COMMUNICATIONS.

INTERESTING RADIO QUERIES AND THEIR ANSWERS.

THE AMATEURS PROBLEMS.

H.R. HICK

ZENNECK'S

Wireless Telegraphy

"The Book You Have Been Looking For"

By J. ZENNECK, Professor of Experimental Physics at the "Technische Hochschule," Munich. Translated by A. E. SEELIG, Mem. A. I. E. E., formerly General Manager, Atlantic Communication Co. 428 pages, 6x9, 461 illustrations, 13 tables, $4.00 net, postpaid.

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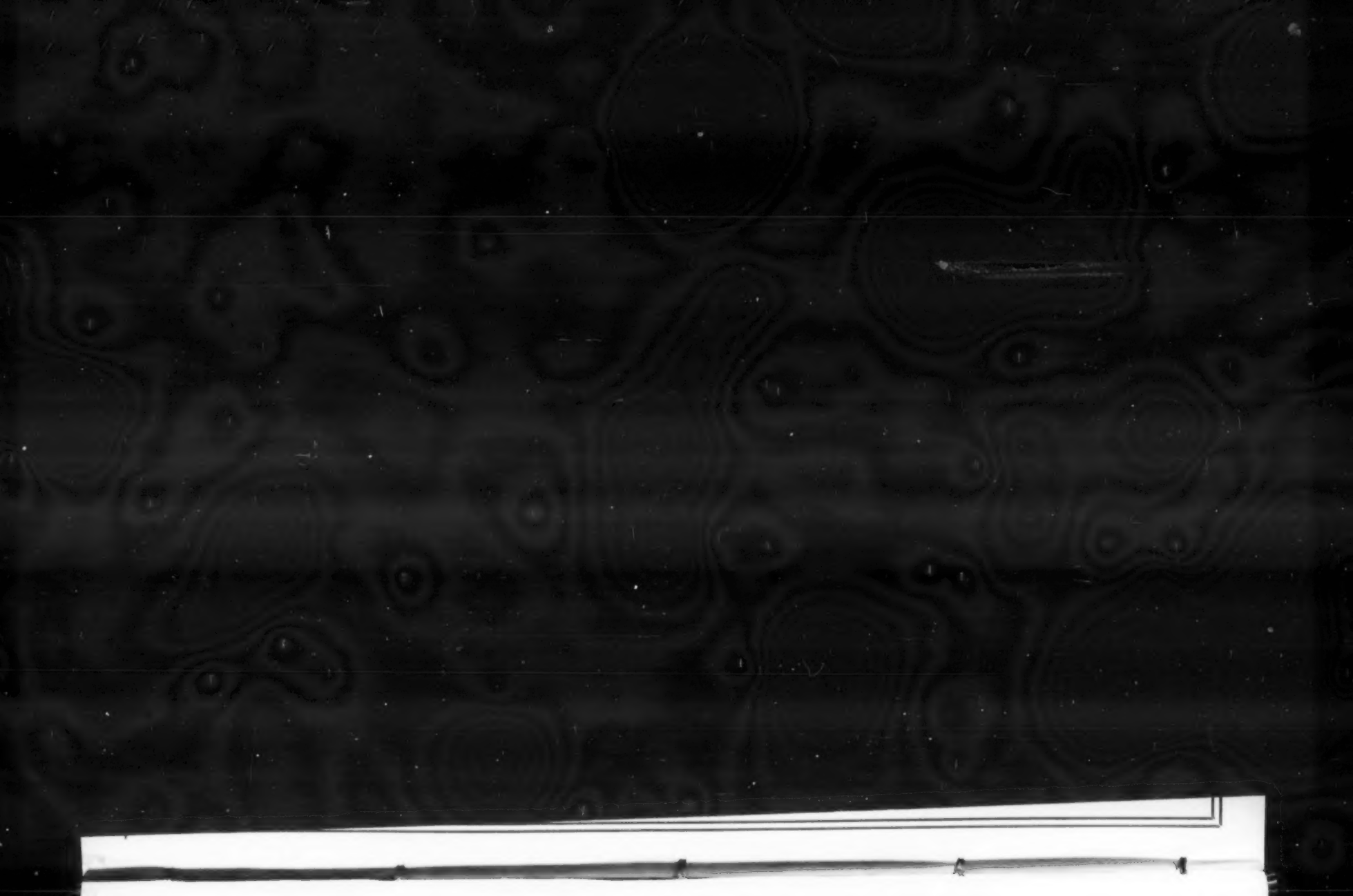
EVERY amateur operator and every student of wireless owes a debt to Mr. Seelig who has translated Dr. Zenneck's "Lehrbuch der drahtlosen Telegraphie." This book has been a standard in Germany and now it is brought to America and translated for us. The book carefully covers all phrases of wireless telegraphy, from the fundamental principles to finished commercial apparatus. In the technical part you will find explanations which clear up every hazy point. Among the interesting features are the illustrations and photographs of dampened sparks. You can find out all about decrement. You see exactly how the ether waves travel. Once you read the book, you wonder how you did without it.

This text is of such great importance to the LEAGUE members that the Secretary has made arrangements to supply the book. Write for it today. There was never a book worth more. You need it: send to the Secretary.

The American Radio Relay League, Inc.

Hartford, Connecticut



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Volume I JUNE, 1916 Number VII

Q S T

A MAGAZINE DEVOTED EXCLUSIVELY TO THE AMATEUR

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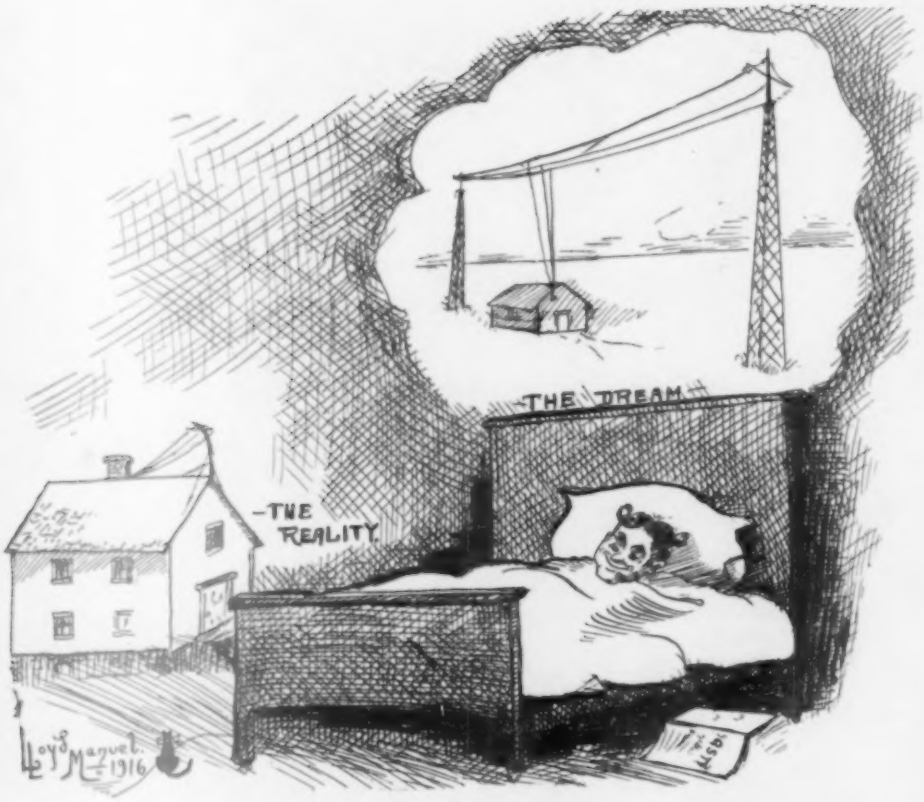


AFTER READING "QST"

: June Radio Relay Bulletin :

Wireless and The Aeroplane

THE AEROFAN
By L. J. Lesh

A paper presented before the Radio Club of America
Copyright, 1916 by the Radio Club of America.

This paper has been presented to Q. S. T. by the Radio Club of America. The purpose is to instruct the amateur in Wireless and its connection with the aeroplane. Mr. Lesh has given us an exceedingly clear description of the problems and the apparatus used. The Aerofan is a means for securing power to drive the radio generators on aeroplanes and it gives us power independent of the continuous operation of the Aerial Vehicles' Propelling Motors. A new field of Radio Engineering has been opened in conjunction with the Aeroplane and Mr. Lesh describes the first attempts in developing effective apparatus.—
Editor.

The problem of the application of radio apparatus to aeroplanes while it offers an attractive and remunerative field to scientific investigators, also presents difficulties which must be actually encountered in order to be appreciated. The necessary reduction in weight to be effected is but one of the important considerations. Actual experiment of this art will require the perfection of at least two new inventions before the aero-radio set can be considered a success.

The devices are, first: a reliable light and efficient means for driving the generator of the radio set; second, an antenna or radiating system which shall have the proper electrical and mechanical prerequisites without interfering with the mechanical and aerodynamic efficiency of the flying vehicle.

In addition to the above distinct inventive problems, two other new factors must be considered involving modification of radio sets adapted to the ordinary requirements. The first problem is that of insulation of high tension portions of the apparatus, particularly when applied to planes of the flying boat order, where the whole machine is subjected to salt water spray. The second question is that of vibration, as affecting the movable parts of meters and instruments and all material of the regular set apt to be crystalized or mechanically deranged by the peculiar vibratory conditions existing on board an aeroplane due to the operation of the motor or motors and the throbbing propellers.

THE PROBLEM OF DRIVING THE GENERATOR

Lightness, efficiency, simplicity, and freedom from the eccentricities or even the total stoppage of the aeroplane motor are absolutely essential. The radio generator must spin through all variations in flight and particularly in case of emergency when the plane is forced to volplane to earth with its motor dead.

In studying the evolutions of an aeroplane in flight, one very interesting fact becomes apparent. The machine at all times

has a forward or transitory speed upon which it depends for its support in the air. In present day aeroplanes and all craft of this type likely to be developed in the future, the minimum speed of sustentation is in excess of forty-five miles per hour. That is, the actual relative speed of the craft to the medium through which it travels must be approximately the velocity mentioned. Under the impulse of the motors and propellers, the aeroplane may travel twenty-five per cent faster, but even if the contained driving force stops, the machine in its slide down the invisible ways of the air propelled by the force of gravity alone, stored during its ascent, must have a forward speed of the order mentioned as its minimum for safe support.

This fact is the basis for the usefulness and value of the aerofan or radiofan as it may be termed, in the art of radio as applied to aviation. The aerofan in its mechanical construction is nothing more than a windmill operating at a tremendous speed for such a structure. The source from which it secures its power, however, strongly differentiates it from a windmill or the converse of a windmill, a propeller. The windmill secures its power from moving air. The propeller uses the air as an abutment against which it acts in a manner analogous to the progress of a nut on a threaded bolt. The aerofan uses the air as a resistance or an abutment truly enough but the real source of power is the motor of the aeroplane itself acting through the air as a transmitter in ordinary horizontal flight and in the volplane permitting the utilization of the gravitational energy stored in the ascent to keep the fan spinning during the glide to earth.

Various methods aside from that developed by Mr. Emil J. Simon and myself, have been proposed and tested as a solution of this problem. A direct connection of the generator to the motor of the aeroplane is out of the question for two reasons. First, possible stoppage of the motor; second, rapid variations in the speed of this prime mover. An independent gasolene engine driving the generator has been tried and found unsuitable on account of the excessive weight of small gas engines in relation to the power produced and their uniformly unreliable operation. The difficulty of starting such small engines may also be cited as a factor not in their favor. The use of secondary driving elements such as compressed air motors, utilizing energy stored by the aeroplane engine itself has been found impractical on account of mechanical complication and prohibitive weight. Manual operation of the generator by means of foot pedals or handles with gear mechanism as used in certain of the government radio sets for field service, finds no application in an aeroplane where more than one-quarter of a horse power is required by the radio generator.

In the matter of weight alone, the aerofan possesses remarkable advantages. An examination of the table and power curve here shown, representing automobile speed tests on a fan weighing but three pounds, being but 24" in diameter and presenting only 140 square inches of blade surface and structural resistance to the air, makes this fact apparent.

The automobile tests which developed this data, were of a preliminary nature conducted in 1912 just prior to the completion and application of the first radio fan equipment to an aeroplane. The same generator, a ¼ K. W. 500 cycle machine used in the actual aeroplane set, was tested out in the automobile trials. Its maximum speed as determined by a direct reading tachometer was about 4000 r.p.m. The aerofan driving it by means of a leather belt spun at 1000 r.p.m. on its ball bearings.

Interesting facts concerning the operation of such a device developed even in these early experiments. The gyroscopic force of the fan causing a tendency for it to precess or rotate into axis at right angles to the direction of any turning movement of the automobile was found to be considerable but not necessarily of destructive or disturbing effect with proper design.

Examination of the aerofan power curve indicates that the energy developed is not proportional to the speed of translation, but that the curve flattens out considerably as the velocity increases and ultimately reaches a maximum beyond which the development of power in relation to speed produces an automatic preventative of racing or overloading the generator. A phenomenon of the same kind is observed in the operation of all propellers and windmills, the interference of the rapidly rotating blades at high speed preventing the air from acting to full advantage.

It had been anticipated that variations in the speed of translation would make necessary the use of some manner of compensator so as to induce a constant power output. One might also expect uneveness in the running of the fan due to operation of the sending key and the consequent variation in load. In practice these factors were found to be negligible. The inertia of the fan and generator was such that load and speed variations with a time period of less than twenty-five seconds, were of no serious consequence.

Actual flying tests with the radiofan were carried out in the fall of 1912 in a Curtiss hydro-aeroplane at Hammondsport, N. Y.

The installation is well illustrated in the accompanying photograph in which it is seen that the aerofan is mounted well forward in the machine and almost on a level with the top surface. The fan was connected to a generator placed below and between the seats of the aviators by a leather belt run through aluminum tubes which prevented its being blown from the pulleys by wind pressure. The key controlling the circuit is seen to be strapped to the leg of the wireless operator who in

this case is Mr. Simon. Transformer, quenched spark gap with McAdamite plates together with suitable inductances and Murdock condenser units required in a ¼ K. W. system, were mounted on a board placed about four feet behind the aviators, so as to balance the weight of the generator and other equipment in front. The antenna circuit included a Seibt direct-reading wave-meter, an ammeter reading from 0 to 5 amperes to be seen at the feet of the aviators and an insulated reel from which could be dropped some 300 feet of stranded bronze wire. This wire was let down from the aeroplane as a suitable altitude was attained and tuning as to wavelength and resonance was accomplished by varying the length suspended. A lead weight of stream-line form weighing 3 lbs. equipped with a sheet metal directional vane held the wire in approximately vertical direction below the machine without appreciable swaying during flight. The coupling of the set was ascertained by several trials and changes which had to be made after the machine reached the earth. Tuning in the air for maximum radiation was accomplished entirely by means of the antenna. The counterpoise in this system consisted of all of the metallic portions of the aeroplane suitably wired together.

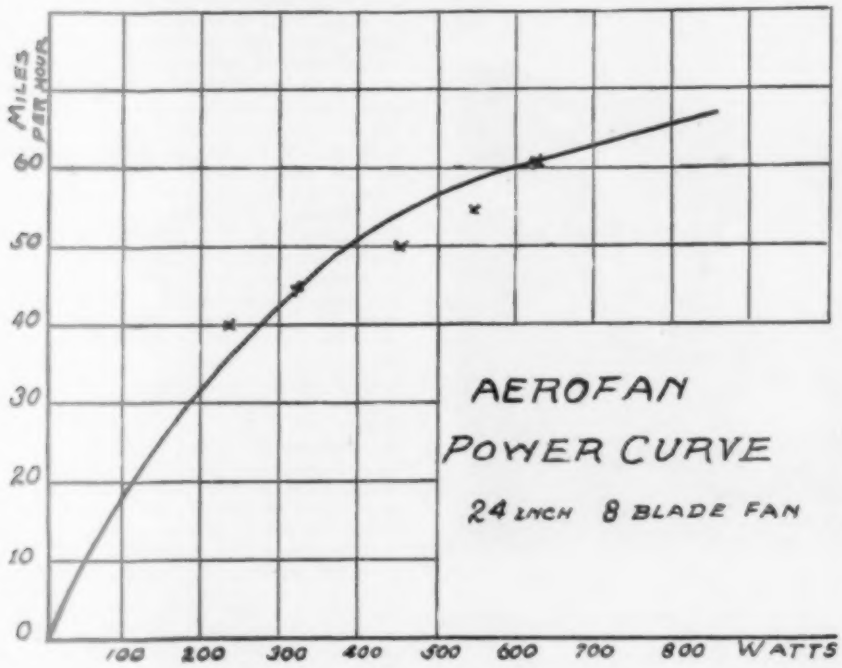
Several flying tests were made with this apparatus, and considering the slow speed with which the plane flew on account of an imperfect motor, the results attained were very satisfactory. The aerofan had been designed for a speed of 60 miles an hour and at 45 miles an hour the highest speed attained with two men aboard, the power output of the generator was but 325 watts, whereas on account of the excellent cooling possible in flying machines, it would have been feasible to run the generator at 100 per cent overload, without excessive heating. Transmission over distances of several miles was effected and from altitudes ranging from 100 to 600 feet. It was established beyond question of doubt; First, that the aerofan was a satisfactory source of power; second, that it was possible to tune by a manipulation of the antenna. An incidental discovery was the destructive effect of vibration. The Seibt wavemeter secured to the front edge of the lower plane became mechanically deranged and inoperative sometime during the first trial flight. From the standpoint of a personal experience and also highly suggestive of the care which must be taken in the insulation of wireless apparatus on board aeroplanes, an incident concerning the tests might be mentioned. By accidentally touching the wireless key at a moment when the lead weight of the antenna came in contact with the metal frame of the aeroplane, Mr. Lesh and the aviator, Hugh S. Robinson, received the full high frequency discharge of the set during a volplane. The shock momentarily paralyzed both aviator and wireless operator, who, however, recovered their presence of mind in time to avoid a fall.

The receiving station erected especially for these tests consisted of a standard 40 foot portable signal corps mast antenna and counterpoise, with a regular Perikon, Navy receiving set. Audibility tests of the incoming signals indicated a transmission range of over 20 miles under ordinary conditions and with the apparatus working at the speed limited by the rather sluggish aeroplane motor. The indisposition from which this motor was suffering, finally came to a head in the shape of a total breakdown which terminated the experiments before actual transmission tests over long distance were accomplished.

As the receiving antenna was relatively vertical, and the suspended aerial of the

aeroplane pointed downwards, it was interesting to note the decrease in audibility apparent when the aeroplane was over the receiving station, and the two capacity elements sending and receiving came to be nearly in line. As a matter of general observation, it would seem highly advisable where an aeroplane is to communicate with a station below, that the antenna of the plane be either caused to float out behind or else be incorporated in a horizontal disposition within the wings or fuselage of the aeroplane. For machines of the order being at present planned and constructed, having wings spread of over 100 feet, it will be quite practicable to place the transmitting instruments in the centre of the machine with radiating wires of equal length, extending out horizontally along each wing structure.

The relatively low efficiency seemingly inherent in aeroplane radio equipment is due to the fact that the radiation is purely in the nature of that from a Hertz oscillator, there being no infinite ground capacity as in all land and water stations.



ITEMS OF INTEREST

BASEBALL SCORES BY WIRELESS.

The Lynn News has made arrangements to send out baseball scores by wireless. Final results in the National, American and Eastern League games will be flashed through the air by Gustave Werner of Lynn, Mass. Mr. Werner is a member of the American Radio Relay League and his station has a radius of thirty miles. The results of each day's games will be sent out with the compliments of the Lynn Evening News at six o'clock each evening. The closing of the games may delay the scores a little but they will be sent out as near six o'clock as possible.

UNITED STATES COAST GUARD SERVICE.

Myron Tong, Electrician, informs us that there are two vacancies on the cutter, Seminole, paying forty dollars per month and clothes and board. If any of the readers are interested, they should apply to Captain Dunwoody, Coast Guard Division, New York.

Rotten Receiving

By Q.R.L.

IN the last number of QST, I read a very pointed article on "Rotten Sending" by "The Old Man." It was a good one and has inspired me to write you one on Rotten Receiving, because I am having more trouble receiving than The Old Man ever had from sending. Listen to this tale of woe:—

I began with a three slide tuner, a lump of silicon, a strand of copper wire taken from a piece of flexible lamp cord, and a wire hooked onto a board nailed to the back of the garage, where the nail holes would not show. We think we came pretty near getting the fellow up at the corner who had a half KW. set. We found this receiving equipment was not quite sensitive enough.

Then we listened to the honeyed tones and words of a young friend who knew how to make a loose coupler. We jumped at this chance and he made one for us which had a slider on the primary and no taps on the secondary. It was a big brute of a coupler and when the slider accidentally got into contact with one of the wires, we got signals, provided they were strong enough and the station sending them was near enough. We decided at once that we were a full-fledged radio station and needed a Government license right away quick, to hang on the wall. We applied for this and secured a Second Grade Amateur station license with call letters which required several days to learn.

When the license shed its intense radiations throughout the room in the attic, we saw at once that some kind of a sending equipment was necessary. We built a transformer which would hook onto the house circuit and give a half-inch spark that was a hot one. From this moment, we can safely say that our radio troubles began. Some few incidents have happened during the three years which have rolled along since we built that transformer, which have not been altogether painful, but they are few and far between. That transformer started us wanting better things, and we have suffered and bled (at the pocketbook) ever since, trying vainly to get them.

I will skip over the harrowing details of getting our sending set so we could get as much noise into the ether as we made in the station. Maybe, when my nerve is up, I will write you about them. They will make you cry. The loose coupler led us to better our antenna. We bought three of the longest sticks of hard pine the biggest lumber yard in town had. We bolted these together, and they covered the entire lot. We had no idea they were going to be so almighty long. The problem of up-ending them gave me a cold chill. After studying the situation for a week, we called in a pole setter who had a reputation of being able to snatch a telegraph pole and stick it in the ground while you turned your back. He brought out a thing he called a "gin-pole." He set this up, and caught hold of the new pole and the latter almost bent double. It pretty nearly stumped the expert, but he got it up finally after completely ruining the beautiful hedge between our lot and our neighbor, and starting a row with another neighbor over using his appletree as a fastening for the guy wires.

This pole was a wonder. True enough, it was far from being as high as we expected, because the pole expert insisted upon using five feet of its valuable length in a hole he dug for it. Just the same, it looked like the real thing. We put up the longest spreaders ever heard of in this locality, and we strung all the copper wire we could afford to buy. We used porcelain cleats for insulators, and a modest little bundle of wires nearly as big as your wrist for a lead in. We figured we were going to get everything in the air when we got this hooked up.

The first time we tried this outfit we could not get anything out of it at all. It was a complete and absolute failure. It turned out that the trouble was with our detector, but we did not know it. We chased down the insulation, and let down the wires and hauled them up again, and soldered the joints and connected the wires together at the far end, and wore out the grass, and spoiled the blow torch, and had a terrible time generally, the net result of which was that the antenna was all right at first. The trouble was with the detector, which had somehow or other gone on the bum.

Our young friend then suggested that what we needed was an Audion instead of a mineral. Then we began to suffer for the want of an Audion. In those days Audions cost money, or at least it seemed a high price to pay for a piece of wireless apparatus. Nowadays we don't even choke at three times the price, which shows how our ideas have changed regarding laying

out money to satisfy an amateur wireless appetite.

In the course of events, the Audion arrived, and this with the husky loose coupler made us feel we were up at the front of the line. (For a few minutes). We really received signals and the detector did not go out when we sent. For about a week we had a glorious good time. Then somebody poisoned us. This fellow allowed as how we had no selectivity. This was a fierce and bitter pill to swallow. In our secret hearts we knew he was right. We also knew that we could not buy this selectivity in a bottle nor in a paper bag, and that the only way to get it, was to look around and find something new to want and then to fool yourself into believing you could afford to buy it. This time it was variable condensers. After a while, we got up our nerve and bought some variable condensers. This was going to give us selectivity and we were to get greater sensitiveness along with the selectivity.

When we put the variables in on the primary and secondary of the old "he" coupler, they very successfully cut down our signals to about one-third of what they were before. When H used the phones he disconnected the variables. When I used the phones, I re-connected them. He insisted they were rotten. I, having paid for them, insisted they were O.K. Then we began suspecting the coupler. We eyed it critically by the hour. At the end of this time, we always thought of several other things to suspect. One was those porcelain insulators on the antenna. Another was, the place where the lead in came through the wall. Another was the height of the near end of the antenna. Our attic and receiving instruments were higher than this before mentioned near end.

Then some one said electrose insulators. There was nothing doing until we had these. When they were up, results were within one-hundredth of one per cent. the same as before. We could get the big Navy stations and some boats but we never could get a smell of any of the New York or Pennsylvania or Jersey amateurs. There seemed to be some kind of a cloud over us as far as short wave lengths were concerned. After completely rebuilding the antenna, including putting in a mast in a tree at the near end and most scrupulously insulating our lead in and using stranded cable, we decided that we were exactly where we stood at first. Our receiving was just plain, simple rotten.

Then we eyed the old loose coupler with some more suspicion. Finally we got a brand new one, the latest thing that skill, science, brains, and money could produce, so the salesman told us, and after much trouble got it connected up. The old "he" loose coupler, which by the way, had had taps put in its secondary, and a new ball bearing sliding contact on the primary, was put away, we thought for keeps. When we tried this new outfit, we got results about one-third worse than our previous worst. This was very encouraging, so we yanked out the new coupler and sent it back with our compliments, and asked to have the money refunded. We put back the old brute in its place, and when we got down to testing it, found that it also was deader than the deadest thing on earth. More trouble. The new coupler was not to blame at all, and we never had the nerve to tell the poor fellow who sold it to us, the naked truth.

We then decided to try the audion bulb. It looked good and it had a good record for some months, but there seemed nothing else to suspect. The new bulb borrowed from our young friend was just as rotten as ours, and yet over at his station he told about how it would bring in Key West so loud that you had to go down in the cellar and hide in a coal bin to prevent its rupturing your ear drums. Maybe, his statements were not quite so strong as this, but they were some strong, it seemed to us.

The flash light batteries in the Audion then had to come out, and when they did, we flung them across the street. New ones were put in and we found the net result was just about the same. The improvement was, conservatively speaking, approximately zero. Then, we thought it might be a good scheme to send the Audion back to the maker and have more taps put in the flashlight circuit. We did this, and the net result was consistent with previous net results, namely, the same.

Then we decided we would chuck out the whole blooming detector and buy a brand new DeForest. We did this, facing bankruptcy in the meantime. When the new detector came, it was nice and shiney, and had the new graphite resistance in the B Battery circuit, and we expected our troubles over, and that we would now hear the distant amateurs which the other fellows claimed they easily got every night. The first time we listened in, we were quite excited. In a moment we discovered that the net result was still consistent, namely, the same. We could get amateurs thirty miles away, but they were faint and hard to read while others got them strong.

There seemed nothing to suspect now, but the old coupler, so we hustled around and bought another new one with a dead end switch in the primary. This looked like the real stuff, and when it came to be

hooked in, we again expected to get things. Again, however, the same old net result.

We were now getting both desperate and mad, so we busted loose and tried one of the new tubular audion bulbs. This came in due season, and expected another consistent net result, but H believed there would be something doing. There was. The first time we put the phones on, we heard a roar of stations which we had never heard before at any station we had ever visited. The long search had ended. We were happy, we got the big noise to the Queen's taste. Such a lot of QRM we had never imagined. And it was all because we had a bad run of luck on bulbs. It had resulted in our fixing up the details of our station, but just the same it had been a long and hard road.

But now, comes the same old trouble. We are sick of these 500 cycle signals on wave lengths from 600 to 2500, and sending the same old kind of stuff about when they are going to ship bolts, and castings, etc., etc. What we want are the amateurs who are from 200 to 500 miles away and sending on wave lengths between 450 and 200. These are just as much in the background as they ever were. Therefore, we are still wanting something we cannot get. We now suspect our station ought to come out of the attic and go down into the cellar, so as to have a short ground connection. Somebody thinks our loose coupler losses are the cause of our trouble. The coupler is wound for receiving long waves and we are told that we cannot get efficiency on short waves unless we have an antenna whose natural period is below these waves, and a receiving transformer which has only enough wire on it to tune up to 500 meters. Another expert says we must keep changing bulbs because some will receive distant signals better than others, although they may be the reverse as to nearby signals. We are trying to get into the amateur relay game and must be able to work long distance amateurs. Up to date, we are all to the good on long wave lengths, but our receiving of short ones is just as rotten, as it ever was. And our antenna is only 90 ft. long with a 50 ft. lead in, and a 50 ft. ground connection. Has any one anything to suggest?

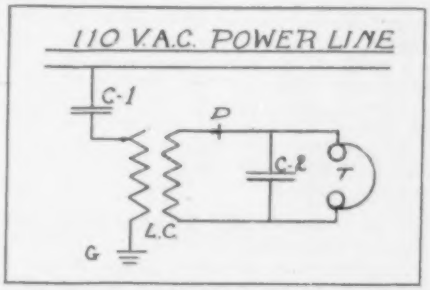
Receiving NAA Over An A. C. Power Line

Press News and Time Signals are Copied Over a Distance of 635 Mile.

(By Walter A. Meyer.)

THE accompanying diagram may be helpful to amateurs who are unable to erect a receiving antenna. The set consists of the ordinary apparatus and by means of the connection shown, a 110 volt A.C. line may be used as the aerial. Condenser C-1 is placed in series with the power line. This condenser may be built of four sheets of tin foil, 3"x5" separated by waxed paper.

In this connection, the writer is using a Mignon RC-2 receiving transformer, two fixed condensers, a home-made Galena detector, and a pair of Brandes Superior Phones. Very little difficulty is encountered in getting NAA in Sheboygan, Wis., with this set and the power line as an antenna. Many amateurs may already know that 110 volt line may be utilized as an aerial in the reception of short distance messages, but to hear NAA very plainly at night on this type of antenna and at a distance of over 600 miles is quite out of the ordinary. The wave length of this antenna in this particular seems to be 200 meters. By inserting the fixed condenser C-1 in series with the antenna circuit, the hum is entirely eliminated.



Editors' comment. Amateurs who experiment along these lines will find themselves in a rather dangerous field and had best take careful precautions in the face of the dangers which they might encounter. Through the receiving hook-up, the power lines may become grounded and other more serious things have been known to take place. The Lighting Companies certainly do not wish to have their lines tampered with.

EDITORIALS

The President walked into the closet we call our office the other day and said, "Well, young fellow, are you going to print QST during the summer months and put us in the poor house, or are you going to acknowledge yourself licked and call it off until Fall?" It sort of bore down on our sore spot, and we fetched a big sigh and leaned back from the typewriter and looked him straight in the eye for a full minute without answering. (Just between us, we had been thinking of the same thing for the previous week.)

It brought the vexed question up and we gathered up the loose papers which operation provided one broken down chair to sit on, and proceeded to thrash it out.

It seemed that the curve we have been plotting of our income showed a fierce droop from about the middle of April up to date, which was May 9th. There has been a droop every month along toward time for a new QST to come along, and we always explained it by the fact that the previous issue had got some stale and was forgotten to a certain extent. But this droop beat all previous droops a mile and then some. The question was whether it was due to the summer weather and outdoor things or because we were a little late this month in getting out, which of course left a longer period for the deadly droop to get in its fine work on the curve.

The more we argued the subject the less it seemed that the fellows lose all interest in radio matters in summer, although of course they do slack up some on operating. But do they lose their interest in the subject in general? Do they not want to know about what is going on in a general way as much as in winter, for there is a lot going on in summer as well as winter? Do they not want to keep in touch with improvements in receiving and sending and know about what works and what doesn't just as much as they ever did? And would not they come along with their subscriptions and help keep the pot boiling?

It was decided that they ought to have a chance to show what they would do, and that it was up to the crowd to decide and not for us to decide for them. This meant going on and getting out a June issue and seeing the result. If the droop is overcome and the orders come in at a frequency some where near that of a condenser discharge, why, it was easy, and we would put an electric fan in the closet and hire the typewriter for a couple more months. If the droop keeps the upper hand, then we must acknowledge we are licked, and we will dig down once again for the printer's bill and take a try at a job waiting at some summer resort or driving an auto truck for some one who doesn't know any better than to waste his time hiring us.

That's how she stands, fellows, so keep us in mind, and do what you can to help. If you have not sent in your subscription get busy. If you have not paid your annual dues, get some one to loan you a dollar quick and QSR, because we may be QRL about the time you read these lines. QRU? ? ? ? ? ?

WESTERN TRUNK LINE REPORT.

Since my last report I have been regularly sending my test messages on Monday and Thursday nights, but on account of bad weather conditions, I have not met with very great success. Several messages have traveled part way and usually I can count on any message getting at least as far as Ohio, on account of the splendid work done by Mrs. Candler, of St. Marys.

One of the hardest tests that could have been given to any relay operator was that which I gave in my message of April 24.

The message was in code and read as follows:—

To all relay stations:

Vex msg tray on April vine vex.
9IK.

Translated into English this is:

73 in the fifth message on the 24 of April. 9IK.

My old stand-by, 8NH, copied this message through static which was as bad as can be imagined.

Many other messages got part way on one route or the other, but none went clear through to the end of the lines.

The relay operators have not been discouraged by these reverses, but are still plugging away as best they can. One man, in particular, finding that he was not getting the test messages, when a whole route was dependant on him, purchased a new receiving set in order to help us out.

On account of the fact that communication is becoming very difficult and erratic, and because many of the operators of important relay stations are preparing to go away for the summer, I have decided, with the approval of Mr. Maxim to discontinue the sending of test messages after the 25th of May, starting in again next September with the same stations and routes as are now in operation. Many of our operators are commercial operators and will soon desert their amateur sets for the less exciting work with the Marconi Co. Among these are 2IB, 9NN, 9JT, 9GY, 8NH and the writer. Others are leaving for the summer months or will not be able to operate their sets because of local conditions. Among these are 9BD, 7BD, 8JX and 9XN. It will be apparent that relay work could not be continued without these stations, without the organization of entirely new routes. Sooner than do this, I have decided to postpone the work until next winter, when we will start in with renewed vigor and with the knowledge that we can do cross-continental relay work by actual test.

(Sgd) R. H. G. Mathews, Dist. Manager.

I have noticed several sending records in QST lately and thought you might find room to stick mine in some corner. I have very recently received a letter from Mr. Campbell, 7BD, of Lewiston, Montana saying that he has heard me there many times loudly. He is located one thousand three hundred miles from me.

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A HINT FOR RADIO CLUBS.

A short time ago, the Editor of QST received a copy of the Rules made up by the Hoosier Radio Club. These rules were printed on a sheet of cardboard which any member of a Radio Club would be glad to tack up on the wall. The most noticeable rule pertained to operating hours. Special times were set aside for tuning, long distance work, city work, etc. The hours of the day were divided up into periods which would not conflict, and this gives the amateur who is interested in long distance work an opportunity to try his skill.

Then we all know how irritating it is to have some one start testing at the very critical point when one is copying a message from a long distance amateur. There seems to be no need of this and with the scheme adopted by The Hoosier Radio Club much of the needless QRM is gotten rid of.

Besides being troubled with testing, one knows how angry one may get when two amateurs persist in talking an hour or more at a time about nothing, or perhaps the color of a girl's eyes and sometimes the cost of a ten cent screw-driver. This is another thing which the rules of The Hoosier Radio Club try to do away with. This is fixed by limiting the time of continuous communications.

These rules affect no hardships on anyone and at the same time improve the conditions of radio communication. The Editor would like to suggest some general scheme of this sort being effected by all the Radio Clubs.

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THE RADIO CLUB OF AMERICA.

On May 12th, at Columbia University, New York City, The Radio Club of America held its regular monthly meeting. A very interesting and instructive evening was spent in listening to Dr. John Stone Stone who lectured on "Fundamental Considerations in Oscillating and Resonance Circuits." The question of amending the restrictive wave length regulations now in force was brought up. Before long the authorities will probably enter into a careful discussion of this subject.

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MIAMI WIRELESS ASSOCIATION.

The amateurs of Miami, Florida, have started an organization called The Miami Wireless Association. At present the club boasts of a membership of fourteen. The officers are, William A. Marsh, Pres., Seymour Dane, Vice-Pres., Howard Henshaw, Sec. The officers hold Government licenses and the majority of the Club belong to The

American Radio Relay League. The Club members see "QST" regularly and think it fine.

The Club would be glad to get in touch with other amateurs and their Clubs. The Secretary's address is, R. F. D. No. 1, Miami, Fla.

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MISSOURI VALLEY RADIO ASSOCIATION.

In November, 1915, the Missouri Valley Radio Association was organized. The Association now has a membership of over thirty-five and is steadily growing. Minutes are exchanged with the Radio Clubs in Lawrence and Topeka, Kansas.

To help the members in securing efficient sets, the Club has purchased a wave meter which is passed around among the members who are assisted in tuning up their sets. A circulating library has also been established for the benefit of the members. Among the periodicals which are found is QST, The Wireless Age, The Wireless World and The Electrical Experimenter. The officers are, Guy E. Wilson, Pres., Tate V. Ragan, Vice-Pres., H. Alfred Fowler, Sec., Robert H. Moore, Treas., and H. A. Reverend, Sgt.-at-arms. All communications should be addressed to the Secretary at No. 3 E. Armour Blvd., Kansas City, Mo.

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THE CALL BOOKS.

We all remember of the long talked of call books and now the Secretary has found it necessary to come forward and admit that "ain't going to be no such thing." We've been plugging along at headquarters trying to get out a new Call Book, but our records show that Call Books will only put us further in debt, and not only that, but that the amateurs and League members do not want or need a List of Stations book. Last issue, we had a thousand books printed and after selling them for over a year, we find there are still a large quantity on hand. This seems to show conclusively that the League members do not want a book. We had enough printed to supply each member with one, but only half of the members made a purchase. And then we were compelled to sell the books at such a late date that they became so old and ancient that the League seemed to have been organized back in the time when there was no wireless.

We have on hand these remaining call books which are valuable in themselves, and as those who have them know, they contain interesting bits of information which are well worth knowing. Of course, much of the data has long since been useless, but still, the books show the location of a large the Proceedings are published.

number of the League stations. We want to help the League members and are now willing to give these books to all who apply if they will send five cents which covers the cost of the envelope and mailing. We trust everyone will understand that these books are not being sold, but are being given away as they are out of date and that the five cents is merely given to pay the mailing cost. The message blank pads which went with them are still up-to-date, as neat a message form as can be found anywhere. We have had a fresh supply of these printed, and as formerly, they sell at ten cents a pad.

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LOS ANGELES AMATEURS FINED FOR RADIO VIOLATIONS.

On March 23, 1916, four amateurs, all residents of Los Angeles, Cal., appeared before Judge Oscar A. Trippet of the United States District Court, entered pleas of guilty to Federal indictments returned last December, charging them with operating radio stations without first having obtained licenses from the Government. Fines were imposed by Judge Trippet and the offenders were admonished to be more cautious in the future. Trial of two other amateurs who pleaded not guilty has been set for next July. The maximum penalty for the above violation is a fine of $100, and imprisonment for a period of two months.

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BOSTON AMATEUR PENALIZED.

On April 19th, 1916, the Radio Inspector at Boston, Mass., reported an amateur in his district for violation of Sections 1, 3 and 7 of the Act of August 13, 1912. The case was referred to the United States District Attorney for prosecution. A verdict of guilty was rendered in the District Court and a fine imposed. The maximum penalty for the above violation is a fine of $500 and confiscation of the apparatus unlawfully used.

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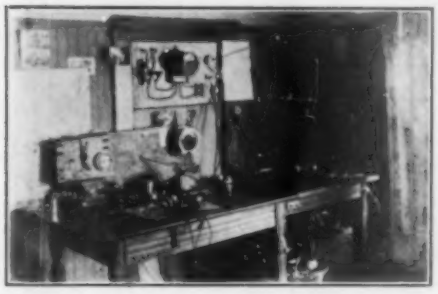
INSTITUTE OF RADIO ENGINEERS.

The monthly meeting of the Institute of Radio Engineers was held May 3rd in the Engineering Society's building, New York City. The President of the Institute, Professor A. E. Kennelly of Harvard University, and Mr. H. A. Affel, presented a very interesting paper on "Skin Effect Resistance Measurements for Conductors at Radio Frequencies up to 100,000 Cycles per Second." Data was given on a number of highly valuable practical measurements which were made on solid and stranded conductors of various shapes and sizes. The results have a direct application in the art and one would do well to secure a copy when

To make "QST" the magazine which you want and need, we must have a large number of pictures of wireless stations. These illustrations bring suggestions and ideas to you. In a picture you may see a better way to arrange your set, a shorter-lead connection, a new oscillation transformer, an ideal condenser. All these things help to improve your set, increase your range, and develop your ability as a Relay Station. If you have a photograph, send it in today. This will help you and your fellow amateurs. If you can write a short description, do that too. Don't think your set is not as good as the other fellows. QST, QST, QST, QRU? QRU? QST?



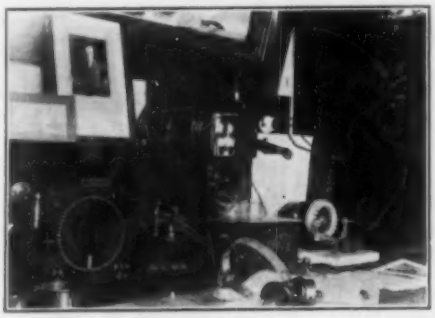
Radio Station 8AEH

The accompanying illustration was sent to us by Mr. Donald W. Balson of Oberlin, Ohio. The illustration is clear enough to show the receiving apparatus. This set has done exceptional receiving from amateur stations and we are informed that the following stations were heard on Galena: 9NN, 9IT, 9DB, 9BD, 9FY, 9AGJ, 9AY, 9LO, 9QB, 9SP, 9PK, 9AAB, 9BC, IZL, 2SX, 3NB, 3UF, 5BJ, and several others at a nearer distance.

Mr. Balson tells us that his receiving results two seasons ago were comparatively poor. At that time he was using a medium size loose coupler. This year he installed a loose coupler of much smaller dimensions and immediately his receiving range went up. The owner of this loose coupler strongly advocates the use of a small loose coupler for short waves with a large coupler for longer. One can get an idea of the size by comparing the loose coupler in the photograph with the Blitzen wave meter near it.

1TH

Here's a set out of the ordinary owned by Mr. Manuel, Newport, R. I. No description was furnished and we are leaving this to our readers, who can doubtless tell about the set and the apparatus from the photograph. The central object seems to be a pancake type of inductance which is built with extreme neatness. President Wilson's photograph is near the set and we are glad to have him with us as the Editor thinks he would make a first-class amateur. Come, amateurs, let's work together, perhaps, some day we can relay a message for Our President.



A Set in Anglesea, N. J.

Sending

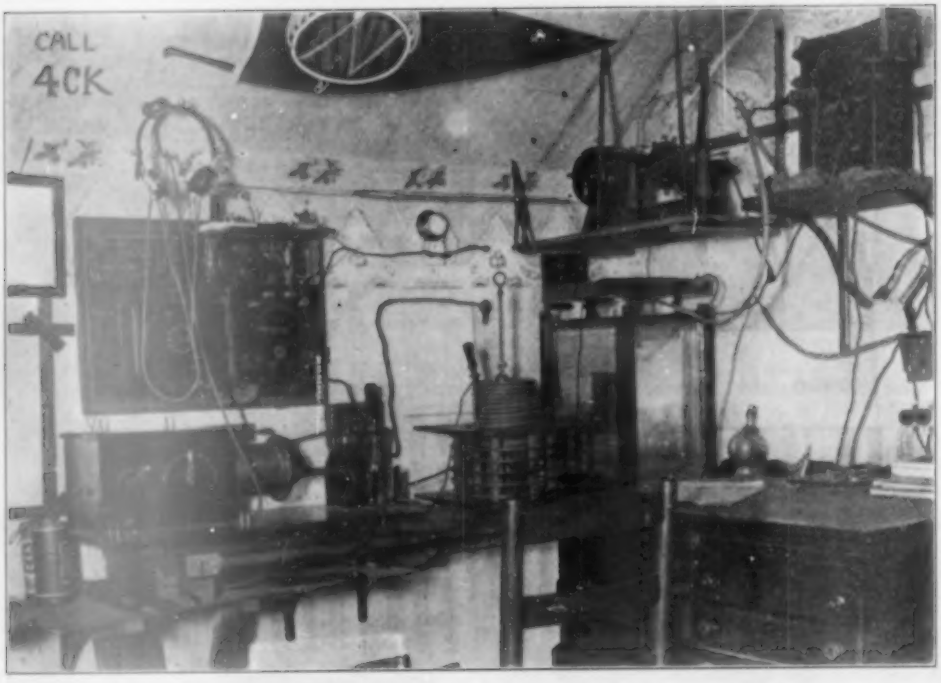
Variable rotary spark, 1-2 Kw. Thordarson transformer, a regular wireless key with dime contacts (I find these very good as they do not stick or burn) a home made oscillation transformer, and a series condenser for a 200 meter wave.

Receiving

A 3,000 meter loading coil, loose coupler Brandes receivers, carborundum, Galena silicon and iron pirates detectors. With the exception of receivers, key and transformers, the set is home made.

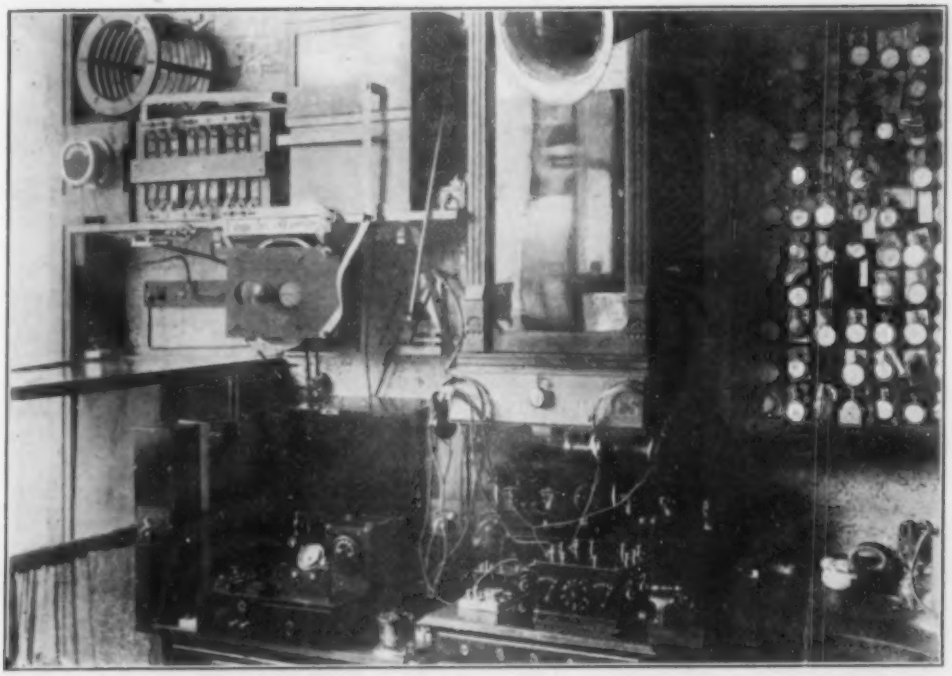
Thomas W. Braidwood,
Anglesea, N. J.

A Wireless Outfit



This is a wireless outfit and not an electrocution room. At first sight, the editor would be a little bit timid on [illegible]ging 4CK's sending set. This feeling of timidness wears off when we learn that C. W. Clodfelter, the owner, succeeded in helping out the Washington's Birthday Message. Good Work. North Carolina is coming on the map again. The Southern and Gulf States were rather backward in wireless work, but with a few more stations like 4CK, they will soon take their place and then the "8-fellows" who are so famous for their long distance work, will have to improve.

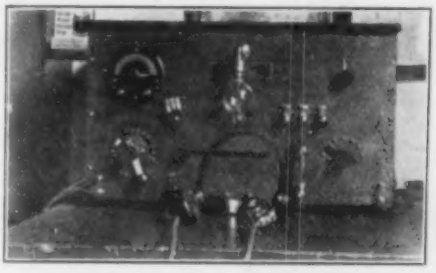
A Time-Receiving Outfit



This photograph illustrates the receiving and sending apparatus owned by Mr. W. O. Horner, a jeweler and optician in Cleveland, Tenn. Mr. Horner furnished the readers of the May QST with a diagram of the connections used in the receiving circuit. As shown, a triple audion is used with a two step Multi-Audi-Fone and a loud speaker connected to a three foot horn. High powered stations have been heard a distance of two city blocks.

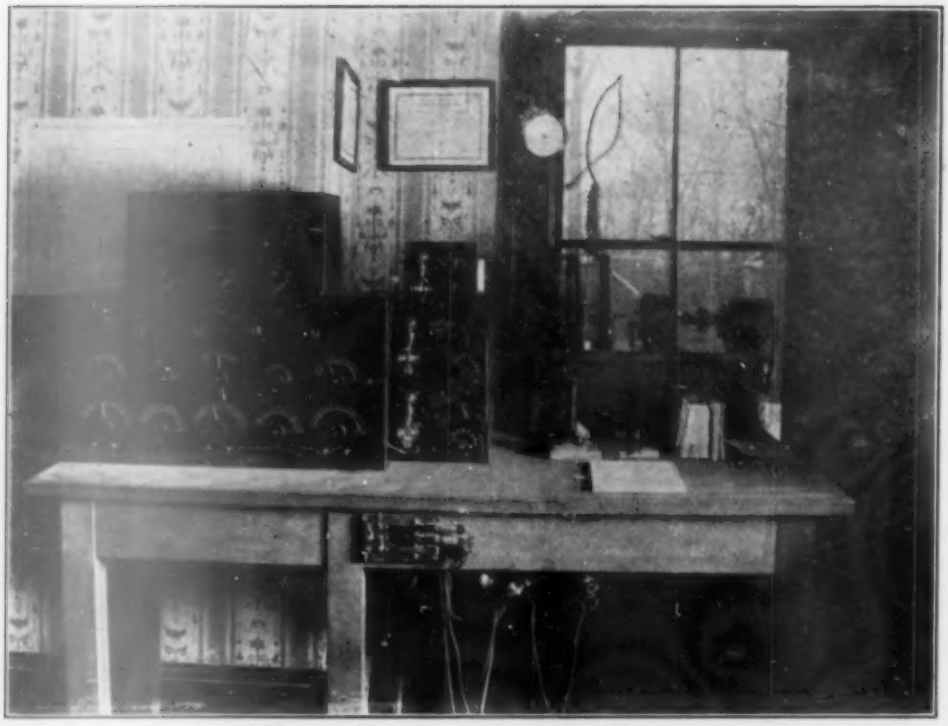
The transmitting set is of one kilowatt capacity and was furnished by Clapp-Eastham Company.

A Panel Set Owned by Mr. R. Chartener



A well constructed receiving set is shown in the accompanying picture which is nearly self-explanatory. The audion is used but a crystal detector is also shown in the hook-up. This appears to the right of the phones and is very sensitive. The loose coupler is operated through a slot in the panel and proves efficient as well as neat. The seven point switch on the right controls the voltage for the audion while the handle just above moves the rheostat. This station is located at 47 Allen Ave., Pittsburgh, Pa.

An "Efficient" Amateur" Set



Mr. John P. Gaty of 29 Morris Ave., Morristown, N. J., is the owner and he sends us the following description:

"Believing that our readers may be interested in efficient receiving apparatus, I enclose a photograph of a set constructed by Paul F. Godley, (2ZE), Leonia, N. J. This set may be described as follows: A regenerative amplifying receiver, designed throughout to conform with the operating characteristics of the audion detector. The switches and variables resistance contact are eliminated as far as possible by inductances of the variometer type. The losses in these inductances are especially low and the dead end losses are entirely absent. What is really three separate tuning systems gives the receiver a range of 200 to 600, 600 to 3,000 and 3,000 to 20,000 meters. This makes the set adoptable to either damp or continuous oscillations. Combined with extreme selectivity an amplification of from ten to 100 times is possible, depending solely on the length of the received wave. Through the amplification and selectiveness, the signals of a nearby amateur station may be brought in loud enough to rise above interfering stations. This has been done with a two-inch spark coil in New York City (30 miles distant) and no trouble was experienced in reading his signals to seven other stations operating within twenty-five miles of here on powers varying from 1-4 to one kilowatt.

Signals from amateurs in Philadelphia, Scranton, Pottstown, Baltimore and Wheeling, West Virginia, are copied in broad daylight. We work 3AFA at Abington. Pa., about 85 miles away at any time of the day. We have also worked 110 miles.

On freak nights, messages are copied from Nebraska, Kansas, and the Dakotas, in the West, and from Carolina and Georgia on the South. Of course, these are all amateurs.

One night, not long ago, we heard SAB calling DDF on 600 meters. This was a freak, as the signals faded after a short time. SAB is Gothenberg, Sweden, while DDF is a German ship probably in the Baltic sea. We can copy at any time, the following stations; Darien, Panama, (arc), NAR (arc or spk.), NPL, San Diego, Cal., (arc), KSS, South San Francisco, (arc),

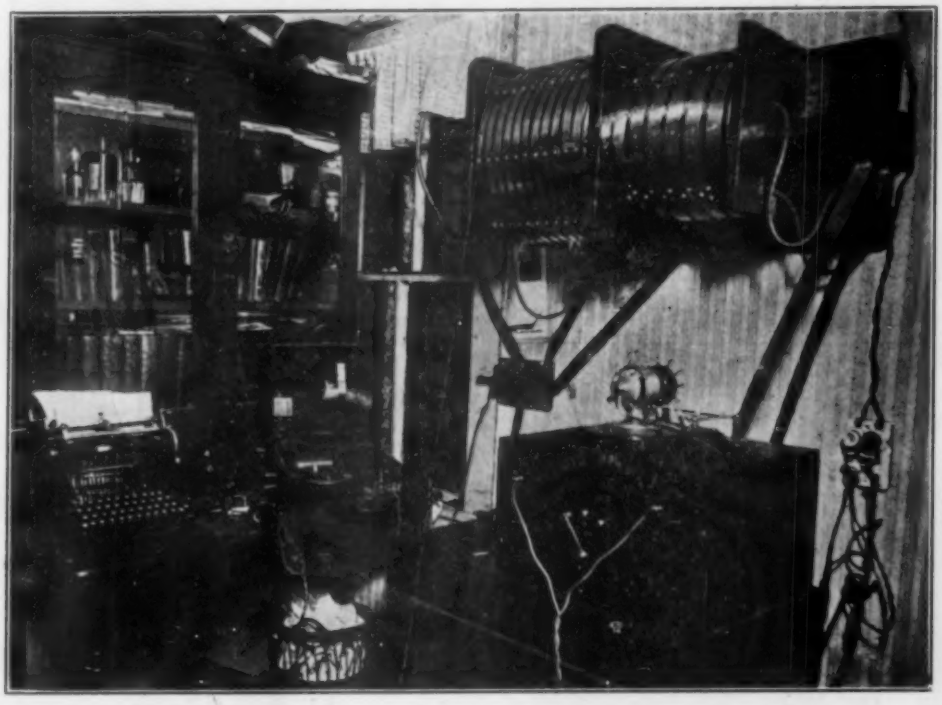
Helia Point, Hawaii, KHX (arc), Ket, Bolinas, Cal. (spark) Glace Bay and Clifton Island, as well as Elivese, and Nauen, Germany.

We have two antennas, one 400 feet long and 60 feet high, while the other is 80 feet long and 65 feet high. The log book shows the following arc stations are operated by the United States on wave lengths varying from 5600 to 6800 meters; NAA, NAD, NAW, NAP, NAT, NAR, NAO, NAJ, NBA, NPL and NAM.

If we may judge from the difficulty these Government stations have in working distant stations, the U. S. A., must have slightly inefficient apparatus. The arc sets seem to be inferior to the German arcs, as our stations frequently break down in the midst of transmission, whereas we have never been interrupted in this way while copying a German station.

EDITOR'S NOTE: The Editor had the pleasure of visiting this station and he wishes to assure the readers that the results were very remarkable indeed. The most impressive thing in the operation was the amplification and selectivity shown by the regenerative audion.

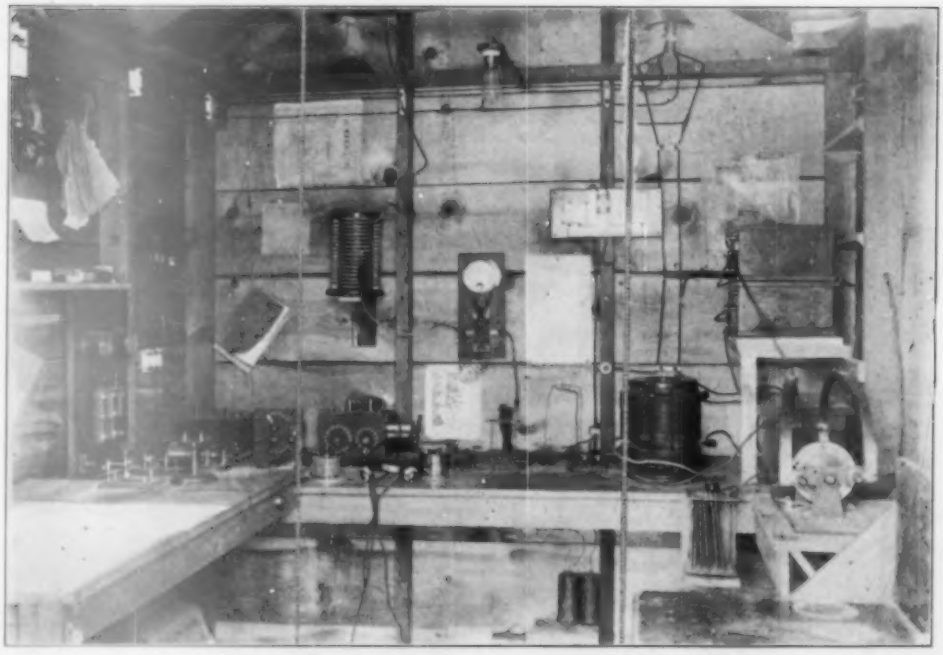
Wireless Station 9IO, Owned and Operated by Lee Henry Bennington, Kansas



The chief interest in this station lies in the fact that all the apparatus, with the exception of key, telephone, and gap, is home made. The owner, Lee Henry, finds it impossible to read the newspapers owing to defective eyesight, so he has designed and installed the set for the express purpose of receiving press, time and weather reports.

The hook-up is made with polished brass with which the oscillation transformer is also wound and the whole presents a rather imposing and business-like appearance at the same time resulting in the highest degree of efficiency. The high potential transformer has an input of 1 Kw. and a secondary voltage of from 16,000 to 20,000. Since this photograph was taken, an audion has been added which makes it possible to hear during day time, those stations which were formerly heard only at night and under most favorable conditions with a silicon detector.

Radio Station of J. G. McCollon, Salt Lake City, Utah



This photograph shows a station in Salt Lake City, Utah. J. G. McCollon is the owner. The sending apparatus is in the right hand part of the picture and is connected with good, heavy leads, which are perhaps a little longer than necessary. The receiving set, on the left, has all the desirable qualities of an efficient set.

The Sending Set of Lindley Winser

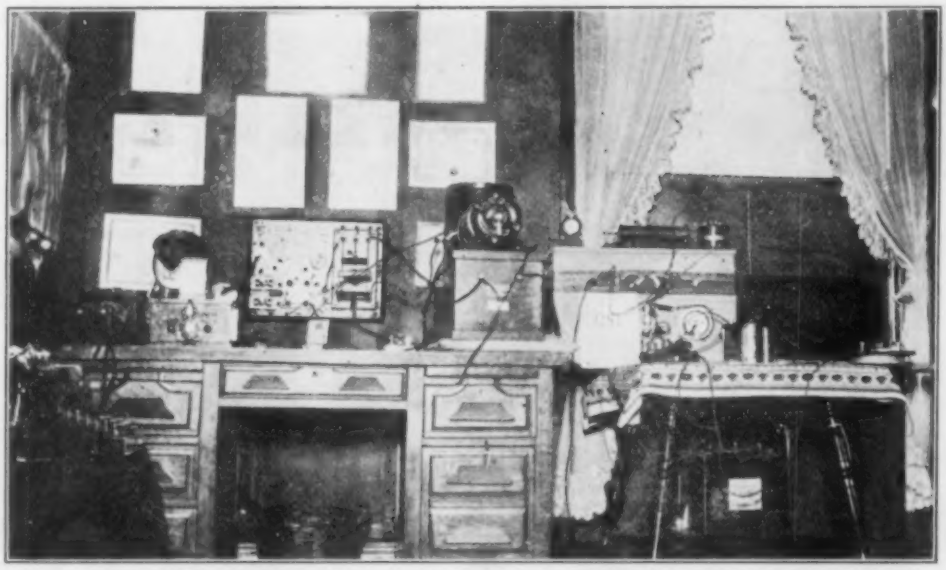
Radio Station 6VZ is illustrated by the accompanying picture and the description which was sent to QST by Mr. Winser. A Packard 1-4 Kw. transformer is used with an input of 440 watts. A glass plate condenser immersed in transformer oil gives very good efficiency. The aerial loading inductance is for sending on a wave length of 425 meters, but as the station is not yet permitted to work on this wave, the induc-

tance shown is not in the circuit. The long lead in the fore-ground does not belong to the oscillating circuit. SHORT CONNECTIONS ARE THE RULES THERE.

The station is located in Bakersfield, Cal., which is well inland. The owner holds a first grade Commercial License and is trying to persuade the Radio Inspector that a Special License would not be misplaced. Mr. Winser hopes to establish communication with 7ZH so that he can form a relay link to Los Angeles and San Francisco from points east. The writer tells us that there is at present no connecting link between northern Oregon and California. Mr. Winser writes "As far as I have been able to learn the Washington's Birthday MSG. from 9XE never reached California on account of this difficulty and other messages from the East have no better luck. I hope the League and QST will continue to prosper and grow strong as they both deserve."

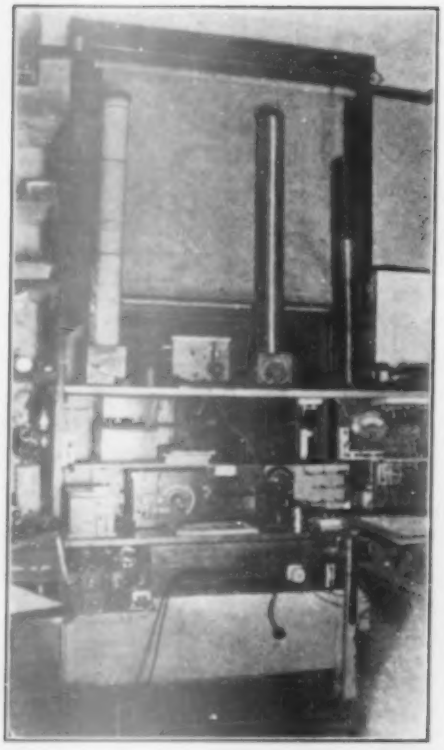
With the 440 Watt input a radiation of 3.7 amperes is secured on 200 meters, while 425 meters give 4 amperes. The greatest distance covered is 7DJ in Hoquiam, Wash., 840 miles, but 7ZH, 680 miles tells me he can nearly always copy 6VZ.

One of the Special License Stations



Mr. Harold C. Bowen of 1ZF sends this picture and illustration. The sending set is a half Kw hytone which has only been in operation about a week. Up to the present time, 90 miles is the farthest distance covered.

The receiving set consists of a small loose coupler, audion detector, a large series variable, and a pair of Murdock phones. An umbrella type aerial is suspended from a mast 70 feet high. On the right of the picture is a receiving set for undamped waves. Nearly all of the arc stations in this country have been heard, as well as a few foreign ones, including Nauen and Hanover, Germany. Anyone hearing IZF will please notify H. C. Bowen, 168 Belmont Ave., Fall River, Mass.

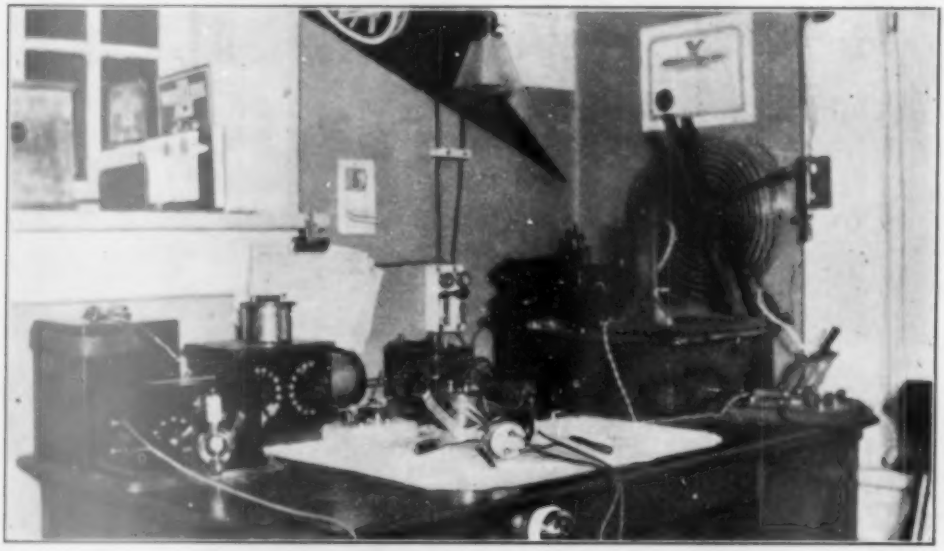


A League Station (2CW)

Mr. Frank M. Ham (2CW) of Cornwall-on-the-Hudson wishes to help out QST with the accompanying photograph. The first shelf shows the regular receiving outfit which tunes up to 3,500 meters. Above this, on the upper shelf, is an Armstrong connection with a tuned wing circuit. The middle of the three coils shown is the tuning inductance. The apparatus on the top shelf is home-made with the exception of a small variable condenser.

Mr. Ham requested the Editor "not to rub it in too much about long leads as the connections were only temporary." When everything is fixed up, the stray wires disappear. Efficient work is done with amateur stations.

Radio Station 9GY, Mattoon, Ill.



The receiving apparatus of this station, owned by Mr. Kern, needs no description. It is the topical audion set. A great many amateurs are heard and 4DG comes in especially fine.

The transmitter pulls 1 Kw. on high

power with a spark frequency of approximately 250 cycles. The close circuit is connected with No. 4 Packard cable, which is composed of 133 strands of No. 25. The apparatus is arranged so that no lead is over ten inches in length. I would be glad to hear from anyone who has copies my signals.

How Tew Mak Itte

The How tew Mak itte dept
cair Kew Ess Tea.

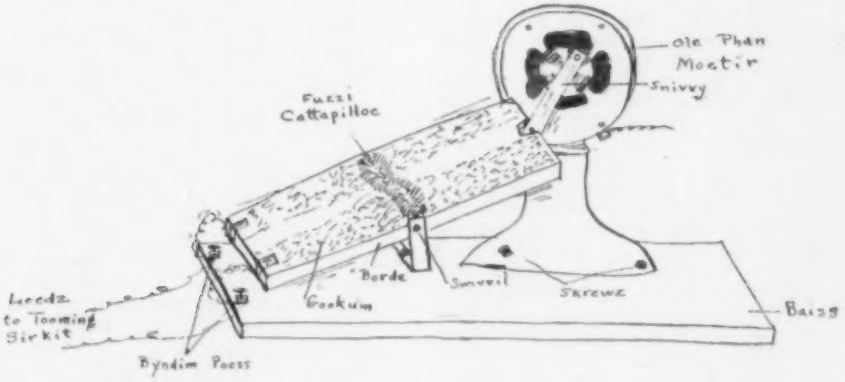
Dere mister sur:

Heerza lil inpruvemint i thawt uppe awn thuh renound "Kristeloy Detectit" az pholloze:

Getta jewsee cattapillow in gud health an puttim awn topova borde wich hez bin treetid az folloze: Goo a lare uv schelak awn itz toppe-seid an them sprae it with ay micks-chure of choppt galeena an munched sillycum, leeving a crac doun the middle lenthwize. Thiss iz mowntid awna swivvil an izz wurct uppan doun bi a lil snivvy ona moetir az shone. The cattapilloe kinneks thuh slabz uv sillycum (oar mollybendite) an tawc abowchir multippil poyntz—Yea Roebottim! Thiss iz cawld the cattapillow ore karpit sweepir detectit, an thuh cattapilloe woant phawl awph becawz the phreecwensea uv the oskilliating bord cachez eem atte eech end uvtha stroac. Tue bitts, pleez.

Yoorz trooli,

Aich Kliphitt.



KUTT NR. DIT-DA-DA-DA-DA

LONG DISTANCE WORK IN MAY.

Despite the reports which say long distance work is impossible for amateurs during this part of the year, we are informed by Mr. Weiss of Port Washington, L. I., that at 1 A. M. on May 13th, he heard 8NH and upon calling she answered. For half an hour, clear communication was established and there was but little static on the Eastern end excepting an occasional "grinder." Apparently was bad at the Ohio end, but by QSZ communication was held. After concluding with 8NH. Mr. Weiss heard 9TC, (Fort Wayne, Ind) and worked with him for five or ten minutes. "The same evening, I heard 2OZ communication with 8CS. I thought this was rather good work for May. Let us hear from others"—J. Weiss, 2FH.

Radio Communications by the Amateurs

Mr. Lindley Winser of Bakersfield, Cal., writes:

"The season of good amateur work is rapidly ending out here, as now the summer static is on and the signals are fading badly. Not long ago, there were three or four stations in Los Angeles and San Francisco who worked regularly almost every night. Any stations between, foolish enough to offer to "QSR" was at once squelched. Things are different now and it is very seldom that direct communication is established; in fact, even with relays, it is very difficult.

One thing I have never seen mentioned by the Eastern amateurs, writing in QST is the trouble experienced from the fading or swinging of signals during the transmission of messages. I do not know if it is because you are not seriously troubled by the phenomenon, that no remark is made on it, but I do know that this is the worst enemy of successful long distance amateur work on the Pacific Coast. I should be interested to hear what some of our members have to say about it. The paper on "Variations in Nocturnal Transmission" and the discussion following it in the proceedings of the Institute of Radio Engineers, Vol. 4, No. 2, touches on the thing I speak of, especially the remarks of Captain Bullard, whose theory would cover the rapid variations in signal strength, equally as well as the seasonal and sunrise-sunset variations.

With the hope that I can aid you in some way to make QST more and more what we all wish to see it: The Wireless Magazine for all The Amateurs, I remain,

Very sincerely yours,
Lindley Winser

EDITOR'S COMMENT: Captain Bullard's theory assumes the earth to be a large conductive surface and above it, a second surface with the intervening atmosphere as a dielectric. The height of the conductive surface above the earth depends considerably on the temperature. The higher the conductive surface is above the earth, the less is the capacity of the condenser; consequently, the electric waves held between the two surfaces of different distances apart, depend upon the temperature. With the higher temperature of daylight, the signals should be correspondingly weaker than when the conducting surfaces are nearer together as at night when the temperature falls. The conducting surfaces being nearer together and the energy concentrated in a small space, makes the intensity of the signals greater.

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A LOUD SCREAM FOR Q S T

By Lee Henry, Bennington, Kans.

During the four years I have been actively in experimental wireless, I have read many text books and periodicals devoted to Radio telegraphy and telephony, and often with that vague feeling of something being wrong. Just where and what it was, I could not determine until the other day when I came into possession of two or three back numbers of QST.

How often and keen have been the disappointments after reading in the newspapers of the wonderful achievements of such men as Marconi, DeForest, Fessenden, Goldschmidt, and a host of others, not to find even the slightest mention of these things in the next or any other number of the particular wireless magazine to which I might happen to be a subscriber. Of course, I subscribed to the magazine with the idea that all subjects on wireless would be dealt with for the benefit of the wireless world. I did not take into consideration the fact that any particular magazine might be controlled by a corporation in whose interest the periodical was published. These house organs rather than mention the exploits of others unless immediately associated with them, would see the wireless world "go hang."

I am convinced that in QST the many thousands of radio workers now have a magazine devoted to real wireless and not to corporation interests. Excuse me for shouting "Long live QST and success to its promoters!" I admire the impartial manner in which QST published Mr. Cole's article on the audion and that little talk with Mr. Turney, inventor with the Crystaloi detector. It was fine in QST. Again let me shout "Hurrah for QST, success to its promoters." Let's we thousands and thousands of amateurs join hands and help along the cause of a real wireless magazine—QST by name, for QST is Us and let's be for QST.

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ONE OF THE WESTERN CORRESPONDENTS

Acampo, Cal.

Dear Mr. Tuska:

Yours of April 6th on hand. This was quite a surprise to me indeed. In answer will say that I shall be glad to act as your Western correspondent and do all I possibly can for the interest of QST and the League. I realize that it is hard to get under way, especially in lining up a lot of fellows so far apart and I will be glad to share a part of the work.

In expressing my sentiments, I might say that my whole heart and soul is right in wireless and especially with the A. R. R. L., for this really amounts to something. It has a definite aim and a good one, that ought to appeal to every wide-awake amateur, but as you say the fellows on this coast are not taking a very active part. I believe it is because they are not very well acquainted with the League. Ever since I first heard of the A. R. R. L., I have been trying "to get next," but not until that sample copy of QST was sent me did I really get into the "swing."

Very sincerely yours,
(Sgd) Paul T. Nesbit.

EDITOR'S NOTE:

Mr. Nesbit is going to act as a Western Correspondent for QST. This will bring QST closer to the amateurs of the Pacific coast, who felt that QST was devoted too much to the amateurs of the East. The Editor hopes that the experimenters of the West will help Mr. Nesbit in his work and inform him of their activities, their experiments, their Radio Clubs, and all wireless news.

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STILL ANOTHER LIKES QST.

QST:—Usually there is an air of austerity about periodicals of the radio field. They are self-contained, making little if any editorial comments, holding themselves aloof from their readers.

The most likable quality of all in QST is its utter disregard of these practices. Whereby it seems to me that I know personally the Editors and had known them in fact for a long time. That they were fellow amateurs like ourselves, facing the same problems, overcoming the same obstacles.

QST is a publication among ourselves to ourselves, but for anyone who will read. It certainly has embodied the amateur spirit to the last degree.

Wendell L. Wright,
Rockland, Mass.

These are the facts; the Editors and Publishers are amateurs like yourselves and are running this magazine after the manner which you suggest, trying to meet the problems which we all face.—Editor.

∞

Q S L

The Editor received a letter as follows from Mr. Edward C. Andrews of Philadelphia, Pa.:

I am enclosing a postal which I have received from Mr. W. T. Fraser of Buffalo, N. Y. (8VX) on which he states my signals were heard in Buffalo clear and strong. This is a distance of over 400 miles and I naturally felt somewhat elated as it was accomplished with 1-4 Kw. Chambers open core transformer.

But aside from the fact that this is a fairly good record, I wish to commend the spirit of unselfishness that is quite evident in Mr. Fraser and others who send cards which tell of receiving the signals of a fellow amateur. While these cards of 8VX (Mr. Fraser) may have come to your attention before, I have never seen a notice about it in our magazine. When one goes to the trouble and expense of having a postal printed in order to inform those who signals he hears, it seems to me that a long stride has been taken, toward aiding the perfection and inspiration to amateur work.

Until I received word from 8VX, I thought my maximum sending range was seventy-five miles. At Mauch Chunk and the Delaware Gap my signals are slightly stronger than NAI and quite similar to WHE.

I would urge upon the members of the A. R. R. L. and the readers of QST to notify by postal and by the very next mail the owner of the station whose signals they hear and to give such other information as they may think of aid or inspiration to the recipient.

Respectfully,
(Sgd) Edward C. Andrews, 3TQ.

EDITOR'S COMMENT: The idea of notifying the amateurs is a fine one, and the Editor earnestly recommends that all of our readers adopt this plan. At small expense, a postal can be had and on it printed a short description of the receiving station and other data which bring the amateurs of our great organization in closer touch with each other.

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A DETAILED DESCRIPTION OF AN EFFICIENT SET.

Let's have more of them.

Cleveland, Ohio.

Editor QST.:

Acting on your invitation to send articles for our magazine, I thought it might be interesting to some of our readers to know the record of 8JZ. Between October 1st and the middle of April, I have worked with the following stations:

2IB, 2ZE, 2XA, 2ZP, 3NB, 3ZS, 4AA, 8CS, 8QB, 8LE, 8NH, 8AEZ, 8WP, 8YL, 8NN, 8QD, 8YI, 8ZT, 8VJ, 9GJ, 9FY, 9JT, 9DB, 9KU, 9SP, 9GY, 9JB, 9PC, 9YG.

The nearest of these is 60 miles and the farthest is approximately 1,000 miles. This takes in ten states outside of Ohio and besides these stations a large number of amateurs have written or indicated that they heard me QSA. This includes KR at Blair, Neb. Eight more states are included by this.

I do not claim or think this is any record as I have heard of other amateur stations working with less than a 1Kw. transformer who have accomplished even greater things in sending and receiving. I do think it might encourage others who have at least ½Kw. and who have not been able to work more than ten miles. Some of the above stations have only ½Kw. and are from 200 to 500 miles from Cleveland. I have learned of a great many amateurs, who, in spite of all they have read about aerials, condensers, short leads, and tuning up their set, try to work 1,000 miles when everything is out of balance. One had an aerial 175′ long and 55′ high, another was using about three plates 5x7 as a condenser for a 1 Kw.; another had leads on his closed circuit fully four feet long, and all these wondered why they could not get any distance.

My aerial is less than 70′ long, averaging 55′ high, super-thoroughly insulated; a ¼ Kw. Thordarson transformer; three Marconi Leyden jars giving a total capacity of .009 mfd; rotary is hard rubber disc, eight inches in diameter with seventeen studs on it, running 1750 r.p.m. Oscillation transformer is made of edge-wise long copper strips and the total length of leads in closed circuit is 19″. In the whole set, no wire touches anything but hard rubber. After carefully tuning my set with a hot wire ammeter I found the radiation was about 5.4 amps. on aerial. The wave length is approximately 200 meters which was found by using a good wave meter. The receiving set consists of a loose coupler and audion.

I think it would be interesting to the readers of QST if some of the more efficient stations would give a detailed description of their sets. It would help those who are not getting results and it would not hurt any of us, because we all can learn something new.

(Sgd.) A. J. Manning.

Items of Interest

As a practical try-out of the Nations preparedness for communications in time of war, a radio demonstration was given in which the Navy Department at Washington was put in instantaneous touch with the naval stations on the Atlantic and Pacific Coast as well as the Battleship New Hampshire at sea. This test lasted for forty hours on May 6th, 7th, and 8th.

A special switchboard was arranged by The American Telephone and Telegraph Company for Secretary Daniels who used the telephone and talked directly with the four corners of the Nation. Officers of the Navy and The American Telephone and Telegraph Company were present and the results were very satisfactory. Many of the amateurs throughout the country probably heard the tests on Sunday afternoon, May 7th, and were surprised at the clearness of the telephone conversation. The static on this particular date was exceptionally fierce, but in spite of all this, the results were noteworthy.

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The Sunbury Daily Item tells of the wireless station owned by Messrs. Kutz and Keifer in Sunbury, Pa. The sending range is about 300 miles, while the receiving is nearly 3,000. Mr. Kutz became prominent in the wireless field when he originated "checkers" by wireless. He has also quite a reputation as an athlete and attended Carnegie Tech.

Rotary Discs

By E. E. House.

It seems to be quite difficult for some amateurs to find suitable material to make rotary discs. I have found a way which appears to be a good one and is cheaply done.

The materials are some heavy, tough, fibrous paper, some orange shellac, a piece of asbestos board, or something to serve the purpose later explained. I used transit board and it worked nicely. A compass and a set of large clamps or a heavy vise and a torch are also necessary.

Take the paper and cut out several discs using the compasses to mark them out, enough are needed to make the required thickness of disc. Let the orange shellac thicken down to about the constituency of New Orleans molasses and cover both sides of all the sheets but two with the shellac. Take the remaining two sheets and cover one side of each, using these for the top and bottom sheets. Now pile up the sheets one on the other and place the transit boards previously cut to a size that will cover the whole area of the paper, on the top and bottom of the pile. Then put the whole pile consisting of shellaced sheets and transit board on top and bottom into the vise, and squeeze as tightly as possible. Heat the transit board with a torch so that the shellac begins to boil out of the edges of the paper. Do not burn the paper. Squeeze the vise tighter and tighter. After having heated the transit in this way, allow it to cool until the shellac is set. If transit board is used, there will be very little trouble in getting the discs off. If iron plates are used, no trouble at all will be found—just rap them sharply with a light hammer and insert a knife in one edge and the plates will fall off.

Now shellac the disc on the outside. This will make a highly insulated disc which is easy to work with sharp iron drills and files. The disc will not warp and will be of high tensil strength. I used fish paper and a disc three inches in diameter, a little over one-eighth inch thick. It weighed one ounce.

Pains must be taken to get straight pieces of transit or sheets of iron as this will govern the true running of the disc. If a torch cannot be had, warm plates up before putting the paper pile between them and then leave for a couple of days in a vise. The disc will harden of itself.

SPECIAL LAND STATIONS

Station	Call signal	Wave Length	Service	Hours	Station controlled by
Bozeman, Mont.	7ZD	200,425	P	X	R. Earl Dawes
Indianapolis, Ind.	9YK	200,450	P	X	James E. Weyant
Lacey, Wash.	7YS	300,450,600	P	X	St. Martin's College
Little Rock, Ark. (5XF)	5XF	Variable	P	X	Arthur R. McReary
Media, Pa.	3XO	300,400,600	P	X	Simon Delbert, Jr.
Oxford, Ohio	8YR	200,425	P	X	Miami University
Philadelphia, Pa. (3XP)	3XP	300,400,600	P	X	Simon Delbert, Jr.
Cleveland, Tenn.	5ZH	425,600	P	X	W. O. Horner

INCREASED PRICE OF BRANDES HEADSETS

C. Brandes, the manufacturer of wireless receivers, has announced the increase in the price of headsets which go into effect immediately. The increased cost of material which enters into the manufacture of headsets has necessitated the increase of prices. The following quotations have already taken effect:

Improved Navy Type Headset	$14.00
Transatlantic Type Headset	10.00
Superior Type Headset, German Silver	5.50
Superior Type Headset, Leather	5.25
Single Superior Headset	3.00
Single Superior Receiver	1.85
Headbands for Navy & Transatlantic Receivers	1.75
German Silver Headbands for Superior Receivers	1.75
Double Leather Headbands for Superior Receivers	1.50
Single Leather Headband for Superior Receivers	.75

This new department has been opened up for the benefit of the readers of "QST". Letters should be addressed, "QST", care of The American Radio Relay League. The Queries Department, Hartford, Conn. The questions will be answered free of charge and as promptly as possible. The answers will in each case, appear in "QST", provided however, they are of interest to the average reader. We are not in a position to answer questions requiring a long, mathematical solution.

The Editor hopes to receive a large number of interesting questions for the next issue. He trusts that you will make your questions of general interest and will refrain from asking questions which you can answer by consulting the Radio Laws and the Call Letter Books. "QST" does not wish to pad this department out with a series of uninteresting, foolish, questions.

George Mason, Fulton, N. Y., asks:

Question 1. Could either condencer C-1 or C-2 shown in the diagram on page 94 of the May "QST" be left out?

Ans. 1. Both these condensers are necessary in tuning the undamped waves. Either condenser may be omitted in receiving the spark stations.

Question 2. Can this hook-up be used on an RJ-4 and if so, what is the connection?

Answer 2. This connection works equally well with the RJ-5 or the RJ-4 audion detector. If you will read carefully the note on Page 94 of the May QST, you will have no trouble in using the same diagram for the RJ-4 model. The only difference being in that the switch is connected in the wire which leads from the positive pole of the illuminating battery to the negative flash-light battery terminal. In the drawing, the posts of the switch should have been marked 1 and 2. Also, the last seven lines of the first column should follow the first four lines of the second paragraph in the second column.

Question 3. Please publish a list of the long wave stations in the United States and Germany, such as Sayville, Hanover, etc., giving hours of transmission and the wave length.

Answer 3. In the United States, the Government stations work on waves varying from 5600 to 6800 meters and their hours of operation are also variable. Most Sunday afternoons, the Government are stations are in operation. The following Naval stations are equipped with arc sets, NAA, NAD, NAJ, NAM, NAO, NAP, NAR, NAT, NAW, NBA, and NPL, Sayville and Tuckerton work on waves of twelve to sixteen thousand meters and send every evening from about nine o'clock until midnight. After they stop, the German stations reply on slightly longer waves.

Question 4. What size short wave condenser would I need to cut down an aerial 90′ long with a ground lead of 45′ to a wave length of 200 meters.

Answer 4. We would advise you to buy a Murdock antenna condenser which will have several connections one of which will doubtlessly give you the proper capacity. However, if you desire to construct one, a glass photograph plate covered with 6x8 tinfoil will reduce your wave to approximately 200 meters.

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L. C. Herndon, Portsmouth, Va., submits these questions:

Question 1. I use 1-2 Kw. Packard transformer, two sections of Murdock condenser, rotary gap and oscillation transformer. Every dash I make is of certain intensity for the first, third of a second and then gets about twice as loud with

the same effect on radiation. I can find no loose connections in the 110 volt lines but cannot look at the leads of the secondary of transformer to the terminals on account of the case being filled with parafin.

Can you explain this? Do you think the lead is disconnected on the secondary of transformer?

Answer 1. The technical Editor does not believe the lead of the secondary is disconnected for if it were, it would get red hot from the arc which it would draw and then things would begin to burn. The explanation probably lies in the transformer. Have you tried another in its place? Can you not borrow one and hook it up for a few tests? If this is not the trouble you may discover it in some trouble with the 110 volt A. C. lines. The Technical Editor remembers of one instance where the lights in a house of an amateur get more brilliant every time the key is depressed instead of dimming as happens in the majority of cases. This is due to some question of balance in the three-wire system.

Ques. 2. My aerial runs about thirty feet overhead of the 110 volt lines which go to the sending set. Does this have any effect on the sending set?

Ans. 2. The power lines most certainly do effect the sending although not necessarily the sending itself. It is a well-known fact that all conductors and partial conductors in the immediate vicinity of an antenna absorb energy. Cases have been known where trees within several hundred feet of an antenna act as good aerials for receiving the signals. It has also been found that trees absorb the waves in the vicinity of a receiving set. The trees also cast a radio shadow and when the receiving apparatus has been moved out of their range, despite the fact that it may be further from the sending outfit, the signals are louder.

Ques. 3. How many sections of Murdock condenser are needed for a half Kw. transformer, with a secondary voltage of 13,200?

Ans. 3. Six sections of Murdock condenser will give the right capacity and when used in connection with one turn of inductance, 8 1-2 inches in diameter, will give a 200 meter wave, provided the leads are short.

Ques. 4. If the set is properly tuned, what should be the approximate ampere radiation using an antenna 85′ long and 65′ high?

Ans. 4. The radiation should be between 3 and 4 amperes with everything tuned to maximum efficiency.

∞

W. T. Gravely, Danville, Va.

I have an oscillation transformer with the primary operating inside of the secondary. Secondary is 16″ high, 11″ in diameter, wound with 22 turns of No. 6 illuminum wire, spaced about 1-2″. The primary is 12″ high, eight inches in diameter, wound with 8 turns of No. 4 copper wire, about 3-4″ apart. This makes the connection to the primary difficult to get at with the helix clips, and I would like to know if it would not be better to take off about 5 turns from the secondary and put in its place 4 turns of the primary wire, leaving a space of one inch between the primary and secondary? Would this arrangement work as effectively as what I now have? It would certainly be easier to handle. There will be sufficient turns in the secondary to vary the coupling although the windings are fixed.

Ans. The Technical Editor would advise you to carry out the change you mentioned and without a doubt, it will be more efficient than the present arrangement. Of course, the whole transformer might be redesigned as you probably have found out that the primary is far larger than you will ever need for a wave length of 200 meters. A turn and one half, 8 1-2″ in diameter will be found sufficient primary for 200 meter waves. With this in mind, it might be possible to put in one fixed turn in place of your primary. Then vary the secondary and the coupling.

FOR SALE & EXCHANGE

WANTED: Articles, photographs, anything that interests the amateurs. For "QST." The Editors, AMERICAN RADIO RELAY LEAGUE, Hartford, Conn.

FOR EXCHANGE: Each month, a brand new number, of a brand new wireless magazine, filled with brand new articles, on brand new subjects. Will exchange twelve numbers of this brand new wireless magazine, "QST," for one dollar. Address, Secretary, AMERICAN RADIO RELAY LEAGUE, Hartford, Conn.

WANTED: Subscription agents for "QST." Help yourself, help the LEAGUE, help everybody. Address, AMERICAN RADIO RELAY LEAGUE, Circulation Agent, Hartford, Conn.

FOR SALE OR EXCHANGE: One inch spark coil, $5.40; 1 spark gap, $1.20; 1 wireless key, $1.00; Helix and condensers; 2 Murdock variable condensers, $8.00; loading inductance, $3.00; Silicon detector with condenser, $5.00; 3 volumes on I. C. S. Electric Railways, 13" "Electricity in the Service of Man," 20 lessons on Hypnotism $20.78; want Motorcycle, violin, typewriter or parts of 1 Kw. transmitter. Write John W. Miller, Jr., 119 Smith St., Peekskill, N. Y.

FOR SALE OR EXCHANGE: 1 Packard ½ Kw. transformer; pair Brandes 2,000 ohm phones; complete oakd receiving cabinet; 3 telephone magnetos; E. I. Co. variable condenser. Want—Visible typewriter, ½ Kw. Blitzen or Thordarson transformer; Blitzen variable; Brandes Navy Type phones. Paul E. Frederick, 215 Clay St., Tiffin, Ohio.

WILL EXCHANGE: new $5.00 Murdock No. 322 detector (with condenser) for Murdock 43 plate variable, used audion or audion-tron bulb, or $3.00. Want C-E DeLuxe or Cheethan tuner, slightly used storage battery of good make. Francis R. Pray, 102 Heath St., Somerville, Mass.

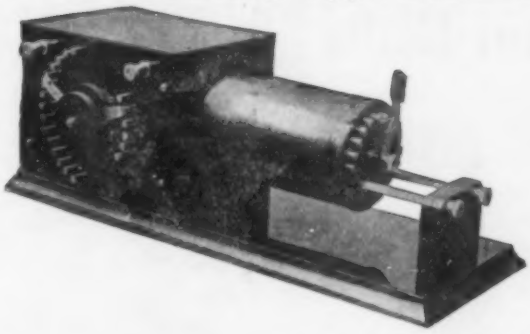
FOR SALE OR EXCHANGE: Holtzer-Cabot type 02 Induction Motor, 1-6 H.P., 1350 R.P.M., 110 Volt 133 cycles, excellent condition. Need wavemeter, hot wire ammeter, Multi-Audi-Fone. K. B. Warner, 402 Washington, Cairo, Ill.

FOR SALE: A Packard 13200 volt transformer in a mahogany case, only $7.50. W. B. Rowley, 905 Wisconsin St., Racine, Wis.

WANTED: Deforest Audion Bulb, any condition, will pay cash. Henry Schrier 1127 S. Park St., Kalamazoo, Mich.

FOR SALE: One 1-4" Bull Dog Spark coil price $1.30. One "Radioson" ultra sensitive electrolitic detector, never been used, price $4.00. One 75 ohm telephone receiver price $.30. One buzzer $.20. One three slide turning coil 13" long price $1.50.

Arnold Navy Type Loose Coupler Price, $15.00



Perhaps you have noticed I specialize and this instrument is my specialty. One must excel when efforts are concentrated on a single instrument. These instruments are not and never were ground out in quantities and the personality of the maker lost. I make every instrument myself, test it and know just what enters into its construction.

With suitable inductance in conjunction with an Audion Detector, this instrument has proven very efficient for receiving undamped waves. This Hook-up will be furnished to prospective purchasers. I also carry the finest line of Switch Points, Rubber Knobs Cabinets and Accessories on the market.

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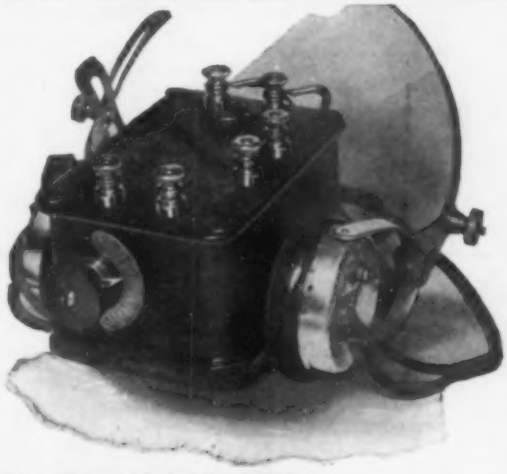

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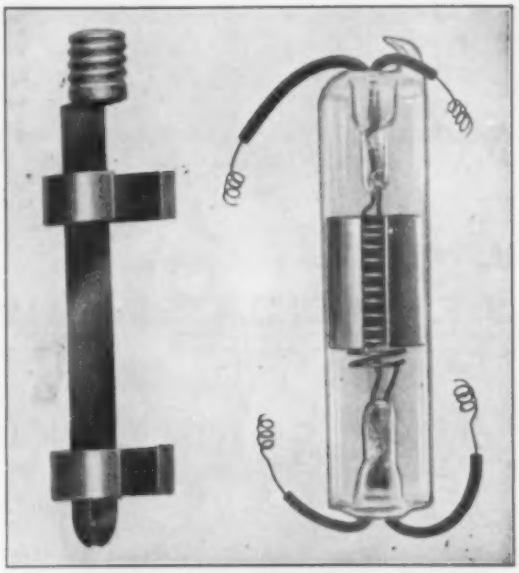

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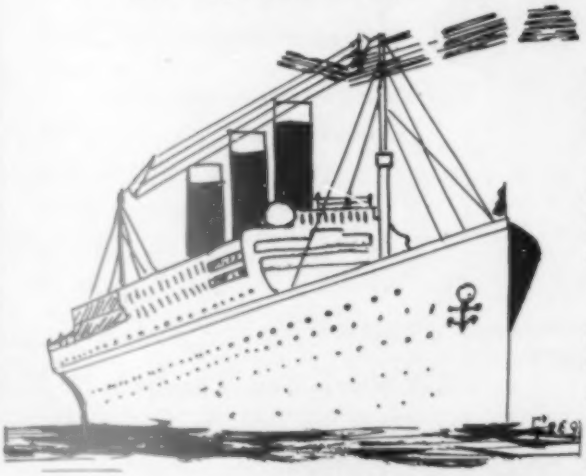

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On Board H. M. T. Canastota,
Havre, France, March 21, 1916

To Whom It May Concern:

This is to certify that I took the Course in Radio Telegraphy at the National Radio School, Washington, D. C.

To anyone desiring a First Class Course in Wireless Telegraphy and a thorough understanding of the Principles employed, I can heartily recommend this school.

Signed, Frank B. Illingworth, Radio Officer in Charge.

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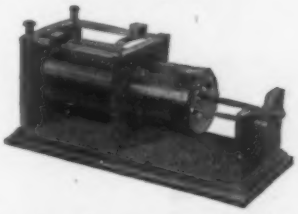

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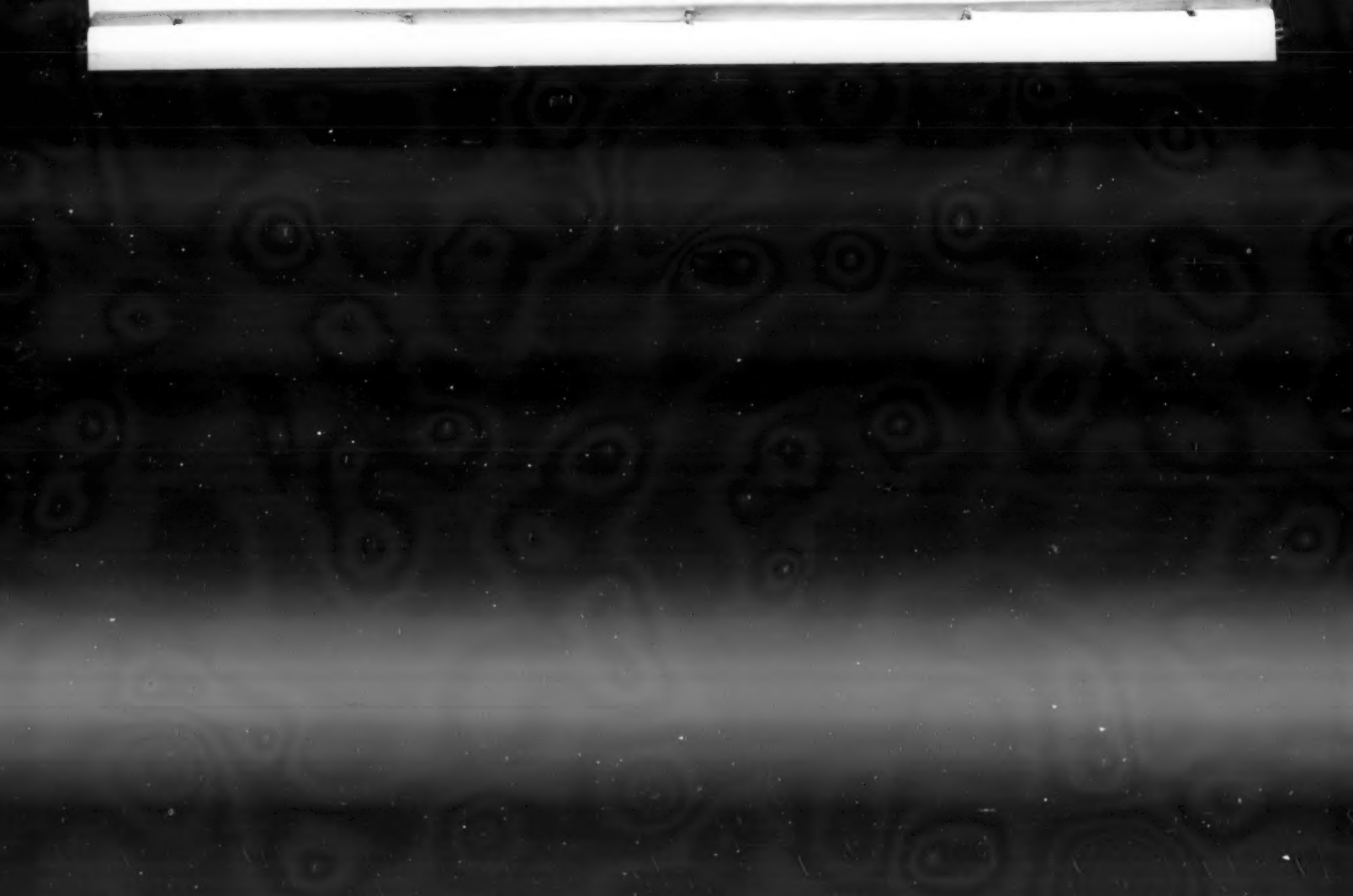

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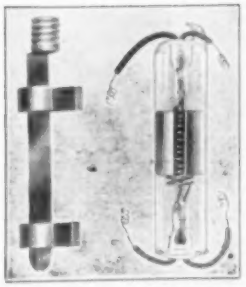
We now offer the new amateur type at $27.50. It is equipped with potentiometer control for the "B" or high voltage circuit, arranged for external batteries to be furnished by the purchaser, has an internal rheostat like our higher priced instruments, and is equipped with the genuine DeForest Tubular Audion with adapter.

No complicated circuits for tuning are necessary or desirable. Simply a regular tuner of proper size is used. No need of spending money on large, expensive coils to receive Darien, Nauen, Eilvese and all the undamped stations.

The genuine DeForest Tubular Audion illustrated herewith is now within the means of all amateur operators. It is sold to anyone in any quantity without the return of the old one.

Fully 50 percent. more sensitive than any other known form of detector and thoroughly reliable. Tests show an operating life of at least 800 burning hours when properly used, equal to at least a year's service.

With it the maximum receiving range can be covered. Suitable for receiving arc and spark signals and also for amplifying. Each equipped with a static shunt to prevent paralyzing from static and loud signals. Guaranteed to be delivered to you in perfect condition.



Genuine DeForest Tubular Audion
Price, $5.50, delivered
Adapter, 40c extra

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Send stamp for Bulletins R16 on the Audion Detectors, Audion Receiving Sets the Tubular Audion and the Ultraudion

DeForest Radio Telephone & Telegraph Company

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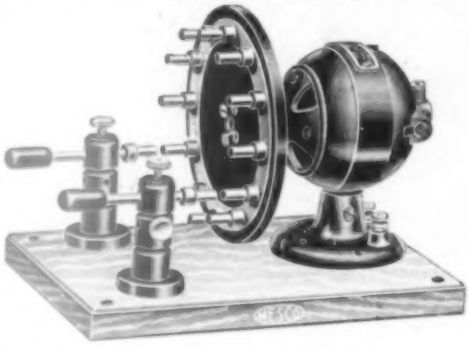
New Mesco Radio Apparatus

ROTARY SPARK GAP

A Rotary Spark Gap is required in every transmitting station by the Federal authorities, for the reason that this type of gap produces a pure wave of low damping decrement. It also increases the efficiency of any transmitting station from 20 to 30 per cent.



This Rotary Spark Gap emits a high musical note, more audible to the human ear, can be heard at greater distances than the note from the stationary type, and cannot be mistaken for static or other atmospheric disturbances, a fault common with the stationary gap due to its low frequency note.

The rotating member has twelve sparking points mounted on a hard rubber disk and is carried on the motor shaft.

Also fitted with two stationary electrodes with special adjusting devices.

The Gap can be successfully used on any of our spark coils or transformers up to and including 1 K. W. capacity.

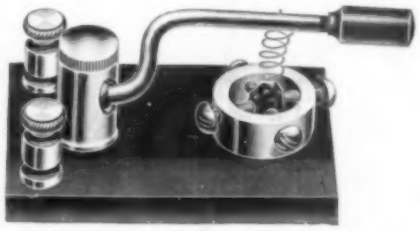
Our standard Globe Motor is used, which will operate on 110 A. C. or D. C. circuits and attains a speed of 4,500 R.P.M. Also made with our Globe Battery Motor, which can be operated on a six-volt circuit.

List. No.		Price
222	Mesco Rotary Spark Gap, 6 volt	$12.00
223	Mesco Rotary Spark Gap, 110 v., A. C. or D. C.	13.00
216	Rotary Unit only, with two Stationary Electrodes, 1 3/16 in. shaft	5.00

UNIVERSAL DETECTOR STAND

This Stand has a heavy brass cup, with four binding screws, capable of holding crystals up to and including ¾ in. diameter.

A hollow standard encloses a brass ball. Through an opening in the wall, a brass arm with hard rubber handle is secured fast to the ball, making a ball and socket joint, allowing it to be adjusted at any angle or used in any position.



A hole for the introduction of different size wires extends through the arm. A set screw in the side of the arm binds the wire.

Supplied with two binding posts. All mounted on a heavy genuine hard rubber base 2¼x 4¼x⅝ in. All metal parts nickel plated. A spring rests on the ball in the hollow standard and sets into a cup under the adjusting screw, so that varying pressures can be had as circumstances require. Remains permanently in adjustment under jars and vibrations of every description.

List. No.		Price
248	Universal Detector Stand	$3.00

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